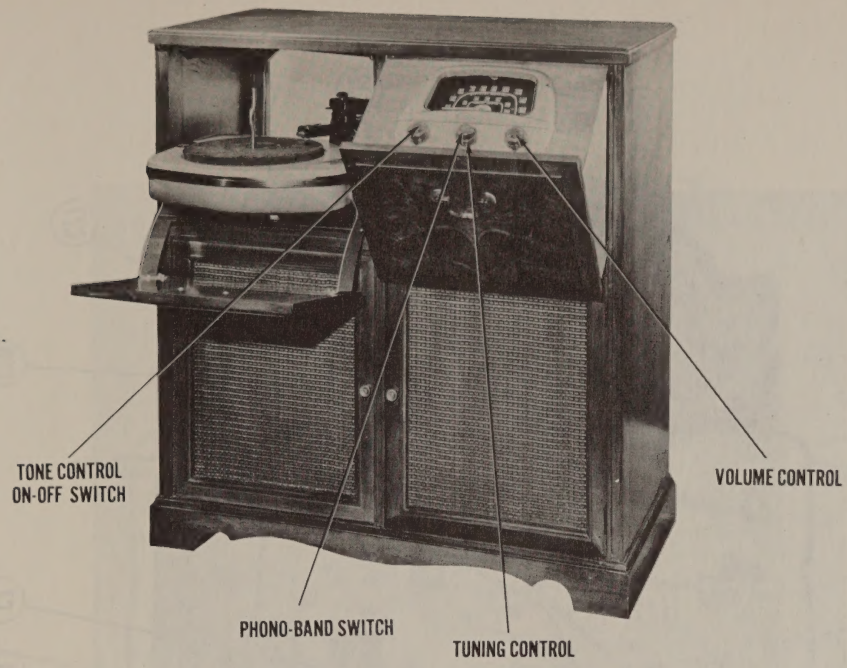
PHOTOFACT* FOLDER SET

*TRADE MARK

NO. 67

CONTENTS

TRADE NAME	MODEL	FOLDER NO.
Admiral	8D15, 8D16, (Ch. 8D1)	4915-1
Aircastle	15	4915-2
Airline	94HA-1527C, 94HA-1528C	4915-3
Automatic	M-90	4915-4
Browning	RJ-20, RJ-22	4915-5
Capehart	115P2, 413P, 414P	4915-6
Challenger	CC18	4915-7
David Bogen	R602	4915-8
Emerson	591 (Ch. 120055A)	4915-9
Firestone	4-A-62, 4-A-63	4915-10
Howard	481B, 481C, 481M	4915-11
Mopar	804	4915-12
Motorola	VT105, VT105M, VK106, VK106B, VK106M, VT107, VT107M, (Ch. TS-9, -9A, -9B, -9C) (Tele. Rec.)	4915-13
Motorola	804	4915-12
National	NC-TV7, NC-TV7M, NC-TV7W (Tele. Rec.)	4915-14
Olympic	TV-104, TV-105, TV-106, TV-107, TV-108, TV-922L, TV-944, TV-945, TV-946 (Tele. Rec.)	4915-15
Silvertone	9153 (Ch. 435.417)	4915-16



ADMIRAL
CHASSIS 8D1

ADMIRAL
CHASSIS 8D1

ADMIRAL MODEL 8D15

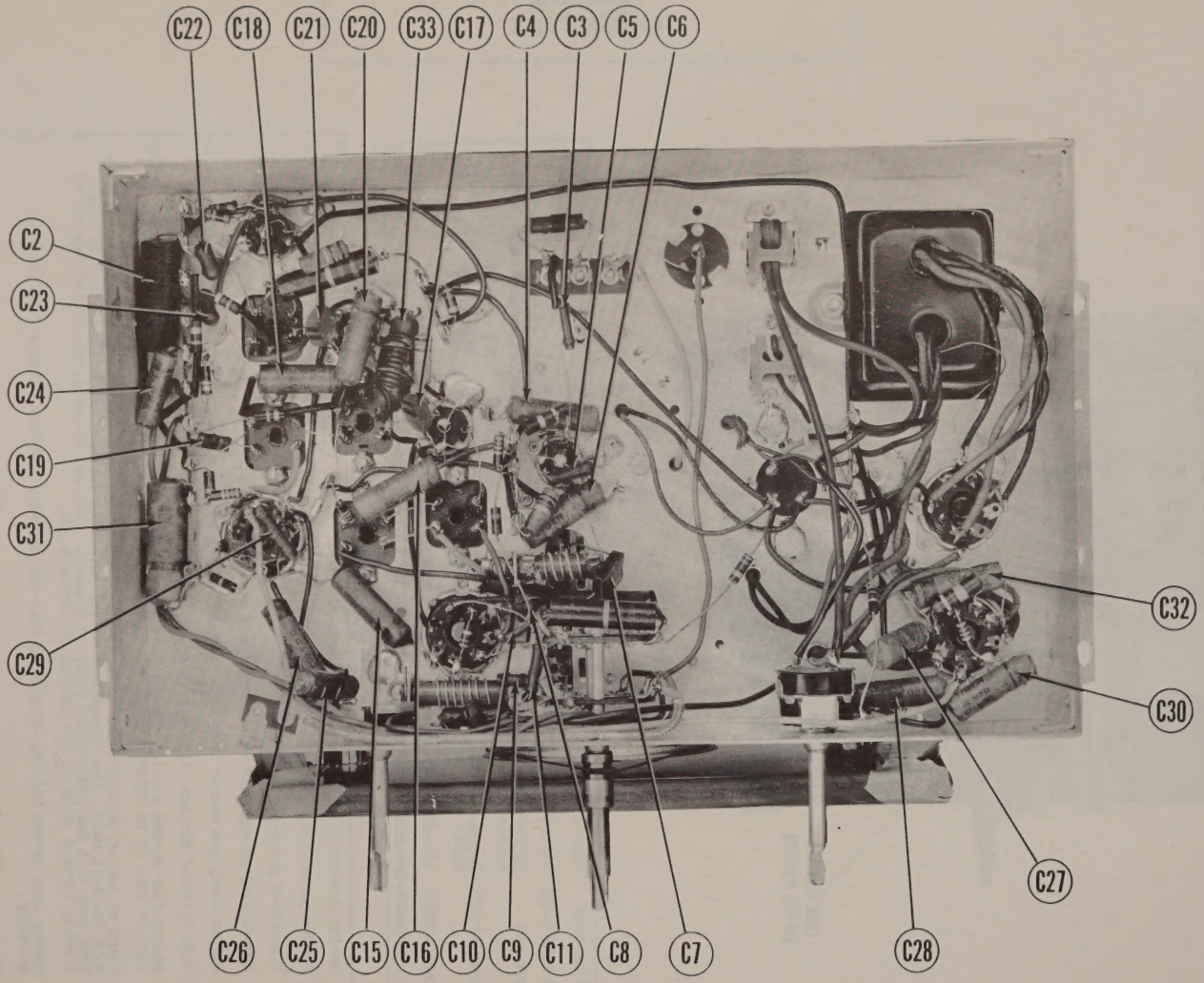
TRADE NAME	Admiral, Models 8D15, 8D16 (Ch. 8D1)
MANUFACTURER	Admiral Corp., 3800 W. Cortland St., Chicago 47, Illinois
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna.
TUBES(EIGHT)	Types 6BA6 FM RF Amp., 6SB7Y Converter, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6AL5 Ratio Det., 6SQ7 DET-AVC-AF, 6V6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC RATING .71 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	530-1620KC FREQ. MOD. 88-108MC

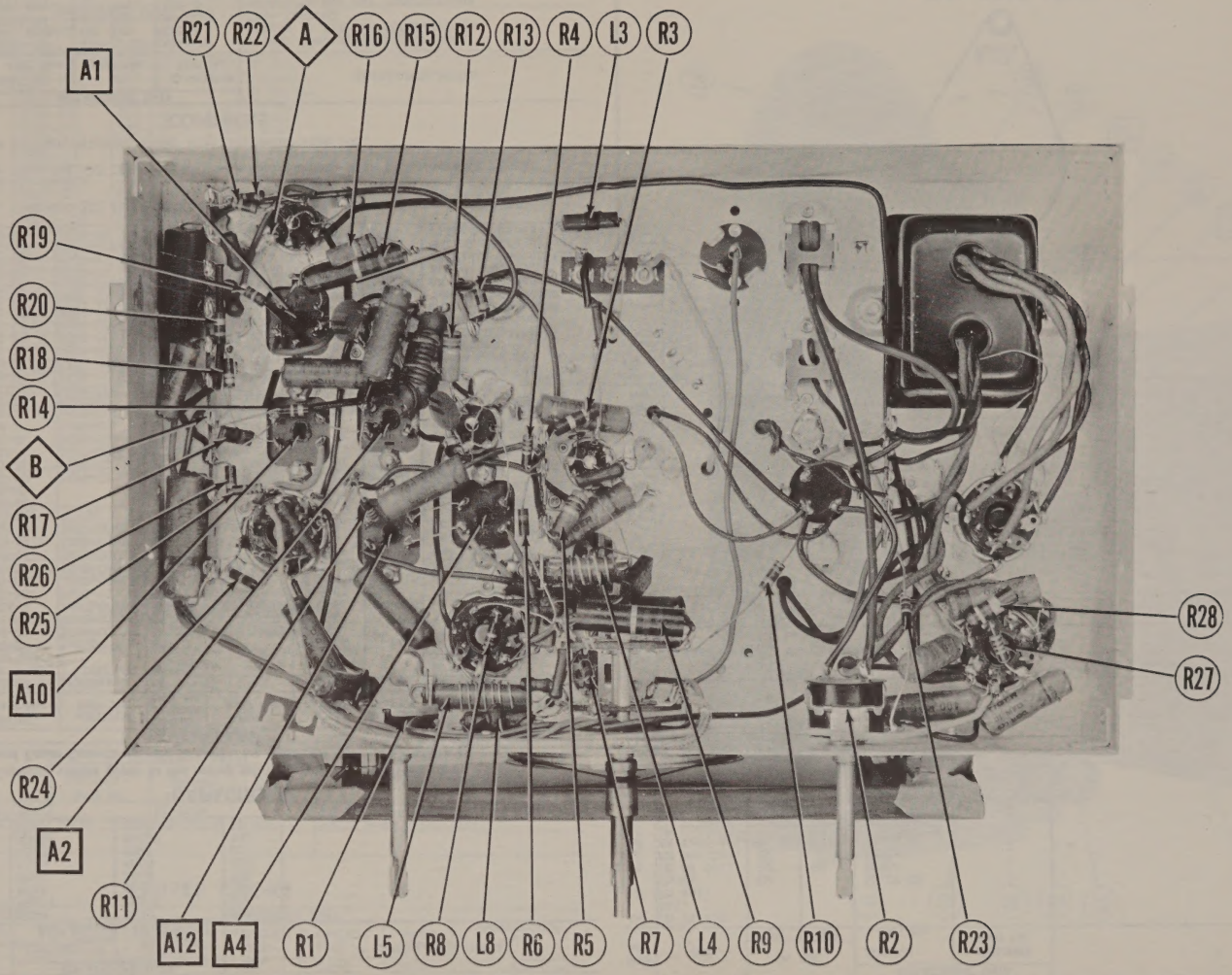
DISASSEMBLY INSTRUCTIONS

1. Remove speaker plug from receiver chassis.
2. Remove phono-pickup plug from receiver chassis.
3. Disconnect phono-motor plug.
4. Remove loop antenna and FM antenna leads from terminal strip on receiver chassis.
5. Remove screw and washer from both tilt-out spring studs on each side of the tilt-out assembly.
6. Slip tilt-out springs off their respective studs.
7. Remove four screws holding tie-bar to tilt-out arms. Tie bar then hangs free on copper braid used to bond it to chassis.
8. Stand at end of cabinet (next to radio compartment) and hold the tilt-out door open slightly with the left hand. Use screwdriver to pry both tilt out arms off their respective studs. Then push tilt out arms toward front of cabinet. Tilt out assembly can then be removed by tipping forward slightly and pulling it straight out.
9. Remove four screws holding chassis to tilt-out assembly. Remove chassis from tilt-out assembly.
10. Remove four hex nuts holding speaker in cabinet. Remove speaker.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


C22
C18
C21
C20
C33
C17
C4
C3
C5
C6
C2
C23
C24
C19
C31
C29
C32
C30
C27
C26
C25
C15
C16
C10
C9
C11
C8
C7
C28


R21
R22
A
R16
R15
R12
R13
R4
L3
R3
A1
R19
R20
R18
R14
B
R17
R26
R25
A10
R24
A2
R11
A12
A4
R1
L5
R8
L8
R6
R5
R7
L4
R9
R10
R2
R23
R28
R27

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	FM RF Amp.	6BA6	6BA6	7BK	
V2	Converter	6SB7Y	6SB7Y	8R	
V3	1st IF Amp.	6BA6	6BA6	7BK	
V4	FM 2nd IF Amp.	6BA6	6BA6	7BK	
V5	Ratio Det.	6AL5	6AL5	6ST	
V6	DET-AVC-AF	6SQ7	6SQ7	8Q	
V7	Power Output	6V6GT	6V6GT	7AC	
V8	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ADMIRAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	350	67C6-25	AF88J4A	UP		DY-313	EL-330	●Filter
B	30	350			4445C				■Filter
C	20	25							▲Output Cath. Bypass
C2	4	150	67A4-2	PRS150/4	BR415		M-4-150	UT-41	Stabilizing Cap
C3	100		65B6-3	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C4	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	AVC Filter
C5	1500		65A14-1	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Screen Bypass
C6	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	RF Bypass
C7	140	500	65B1-26	1468-00015	5W5T15	GP2K-150	MO.5-315	1FM-315	RF Coupling
C8	22		65B6-47	1468-000025	5W5Q25	GP1K-25	MO.5-425	MS-425	RF Coupling
C9	35		65B6-46	1468-00004	5W5Q4	GP1K-50	MO.5-44	1FM-44	Osc. Grid Cap
C10	100	500	65B7-17	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Osc. Anode Bypass
C11	1500		65B14-1	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Osc. Feedback
C12	7		65B6-45						Fixed Trimmer
C13	7		65B6-45						Fixed Trimmer
C14	7		65B6-45						Fixed Trimmer Note 2
C15	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Decoupling
C16	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	AVC Filter
C17	5000		65A10-1	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st IF Screen Bypass
C18	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	1st IF Decoupling
C19A	100		Note 1	1468-001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
B	100		Note 1	1468-001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C20	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	2nd IF Grid Filter
C21	5000		65A10-1	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Screen Bypass
C22	100		65B6-9	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Load Cap Note 3
C23	100		65B6-9	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Load Cap Note 3
C24	.002	600	64B1-14	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	De-emphasis
C25	.005	600	64B1-12	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C26	.005	600	64B1-12	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C27	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Tone Compensation
C28	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Tone Compensation
C29	250		65B7-21	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	AF Plate Bypass
C30	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C31	.1	400	64B1-20	P488-1	GT4P1		ST-4-1	TM-1	AF Plate Decoupling
C32	.005	600	64B1-12	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Output Plate Bypass
C33	.01	400	64B1-25	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Filament Bypass Note 4

Note 1. Items C19A, C19B and R17 Are Combined Into One Unit Obtainable Under Mfgr's Part No. 63A3-1.
Note 2. Not Used In All Models.
Note 3. When Either Item C22 And C23 Are Replaced, Replace Both With Capacitors Of Equal Value.
Note 4. Replace The 10 Turn Filament Choke When Replacing Item C33.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ADMIRAL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	75B2-10	Q19-137X	AT-112	Volume control tapped @ 500KΩ
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions
R2A	2 Meg.	½	75B1-24	Q11-139	AM-83-S	Tone control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R2A per instructions
C	Switch		Not Req.	76-1	SW-A	Attach to R2A per instructions

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: MEISSNER PART No.
L2	FM Dipole Ant.				
L3	FM Ant. Choke	0Ω		AB103-33	
L4	FM RF Coil	0Ω	0Ω	69A55	
L5	FM Osc.Coil	0Ω		69A54	
L6	AM Loop Ant	0Ω		95A24-2	
L7	AM Loop Loading Coil	1.5Ω		69A56	
L8	AM Osc.Coil	6Ω		69A20-1	14-1060
L9	FM 1st IF	0Ω	0Ω	72B37	
L10	AM 1st IF	9Ω	9Ω	72B54	
L11	FM 2nd IF	2.2Ω	0Ω	72B38	
L12	AM 2nd IF	10Ω	10Ω	72B49	
L13	Ratio Det.	2Ω	.2Ω	72B39	
L14	Fil. Choke	0Ω			

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: ADMIRAL PART No.	NOTES
M1	Bayonet	6-8V	0.15A	Brown	81A1-8	Type #47
M2	Bayonet	6-8V	0.15A	Brown	81A1-8	Type #47

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: ASTATIC PART No.	REMARKS
M3	409A11		

MISCELLANEOUS

ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
M4	Switch	77B18	Band-Phono
M5	2 Gang Var. Cap.	68B16	(23-528MMF, 23-165MMF)
	Dial Scale	A1676	
	Dial Pointer	A1685	
	Cabinet	35E88-1	Model 8D15
	Cabinet	35E88-2	Model 8D16
	Knob	33B31-1	Band-Phono
	Knob	33B31-2	Tuning
	Knob	33A13-4	Volume/On-Off Tone

TUNING GANG FULLY CLOSED

DIAL CORD DRIVE

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	ADMIRAL PART No.	IRC PART No.	
R3	390Ω	½	60B8-391	BTA-390	FM RF Grid
R4	470KΩ	½	60B8-474	BTS-470K	AVC Network
R5	22KΩ	1	60B14-223	BTA-22K	FM RF Screen
R6	1 Meg.	½	60B9-105	BTS-1 Meg.	AVC Network
R7	47KΩ	½	60B8-473	BTS-47K	Conv. Grid
R8	47KΩ	½	60B8-473	BTS-47K	Osc. Grid
R9	15KΩ	2	60B20-153	BT-2-15K	Osc. Anode
R10	470Ω	½	60B8-471	BTS-470	Conv. Plate Decoupling
R11	470KΩ	½	60B8-474	BTS-470K	AVC Network
R12	27KΩ	1	60B14-273	BTS-27K	1st IF Screen
R13	470Ω	½	60B8-471	BTS-470	1st IF Decoupling
R14	220KΩ	½	60B8-224	BTS-220K	2nd FM IF GRID
R15	15KΩ	2	60B20-153	BT-2-15K	Voltage Dropping
R16	27KΩ	1	60B8-273	BTA-27K	Voltage Dropping
R17	47KΩ	½	See Note 1	BTS-47K	Diode Filter
R18	220KΩ	½	60B8-224	BTS-220K	Diode Load
R19	390Ω	½	60B8-391	BTA-390	Balancing
R20	27KΩ	½	60B14-273	BTS-27K	De-emphasis
R21	6800Ω	½	60B7-682	BTS-6800-5%	Ratio Det. Diode Load
R22	6800Ω	½	60B7-682	BTS-6800-5%	Ratio Det. Diode Load
R23	47KΩ	½	60B8-473	BTS-47K	Tone Compensation
R24	10 Meg.	½	60B9-106	BTS-10 Meg.	AF Grid
R25	470KΩ	½	60B8-474	BTS-470K	AF Plate
R26	22KΩ	½	60B8-223	BTS-22K	AF Plate Decoupling
R27	470KΩ	½	60B8-474	BTS-470K	Output Grid
R28	390Ω	1	60B14-391	BTA-390	Output Cathode

Note 1. Items R17, C19(A) And C19B Are Combined Into One Unit Obtainable Under Mfgr's Part No. 63A3-1.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	ADMIRAL PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ .71A	520VCT .095A DC	5VAC @ 2A	6.3VAC @ 2.5A	80B5	P-6312#	PH-70#	P-2952#

#Add Series Resistor To Reduce Plate Voltage.

TRANSFORMER (OUTPUT)

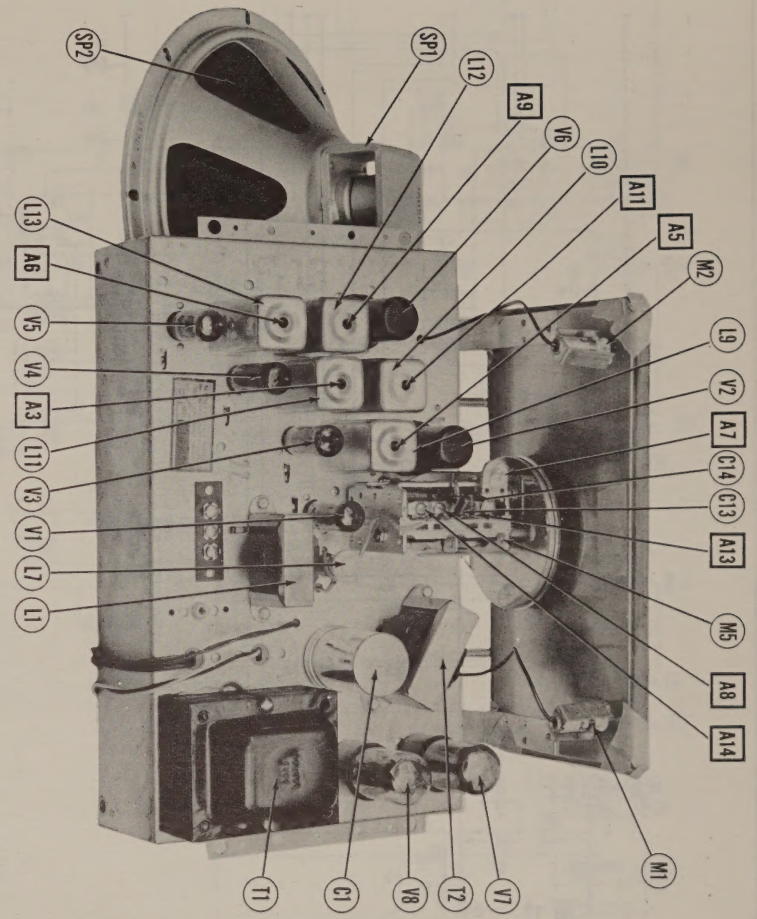
ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		ADMIRAL PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	5500Ω	3.5Ω	275Ω	.4Ω	79A9	A-3825§	RO-9	A-2902§	§Drill One New Mounting Hole

SPEAKER

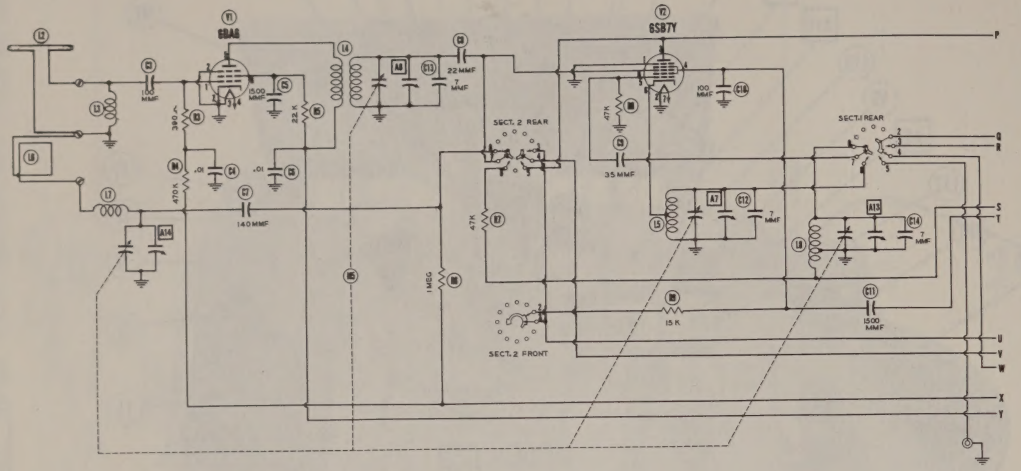
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			ADMIRAL PART No.	JENSEN PART No.	QUAM PART No.	
SP1	FIELD	V.C. IMP.	78B28	ST-120* MOD.P10-8	10A31	*Replace output transformer to match 6-8Ω voice coil
	PM	3.5Ω				
SP2	CONE DIA.	V.C. DIA.				
	9-1/2"	1"				

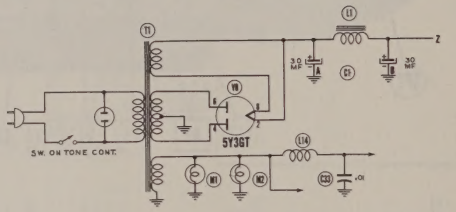
FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	ADMIRAL PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
L1	.095A	120Ω	3.3H	74A10	C-2303	R-885	C2974†	†Drill New Mounting Holes



DATE 8/46 49-1316 SER #47 FOLDER #1





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
#V1	6BA6	-.7VDC	0V	0V	6.3VAC	250VDC	125VDC	0V	
#V2A	6SB7-Y	0V	0V	240VDC	100VDC	§-6VDC	0V	6.3VAC	-.4VDC
V2B	6SB7-Y	0V	0V	240VDC	100VDC	§-6.3VDC	0V	6.3VAC	-.5VDC
V3	6BA6	-.6VDC	0V	0V	6.3VAC	250VDC	115VDC	0V	
#V4	6BA6	-.7VDC	0V	0V	6.3VAC	100VDC	100VDC	0V	
#V5	6AL5	.3VDC	-.2VDC	0V	6.3VAC	0V	0V	0V	
V6	6BQ7	0V	-.7VDC	0V	-.5VDC	-.5VDC	65VDC	6.3VAC	0V
V7	6V6GT	0V	0V	240VDC	245VDC	0V	65VDC	6.3VAC	14VDC
V8	SY3GT	0V	280VDC	0V	285VAC	0V	285VAC	0V	280VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

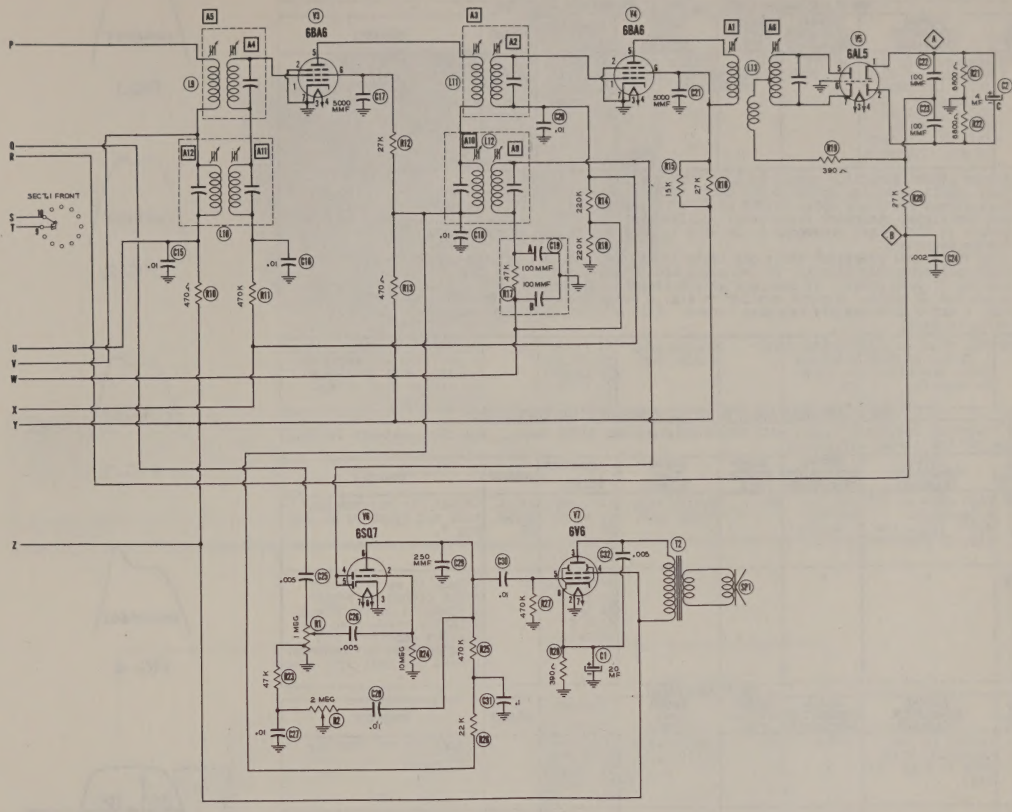
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
#V1	6BA6	850KΩ	0Ω	0Ω	.2Ω	*120Ω	*22KΩ	0Ω	
#V2A	6SB7-Y	0Ω	0Ω	*600Ω	*18KΩ	47KΩ	0Ω	.2Ω	47KΩ
V2B	6SB7-Y	0Ω	0Ω	*600Ω	*18KΩ	47KΩ	0Ω	.2Ω	1.4 Meg.
V3	6BA6	850KΩ	0Ω	0Ω	.2Ω	580Ω	59Ω	0Ω	
#V4	6BA6	440KΩ	0Ω	0Ω	.2Ω	*10KΩ	*10KΩ	0Ω	
#V5	6AL5	6.6KΩ	6.6KΩ	0Ω	.2Ω	Inf.	0Ω	Inf.	
V6	6BQ7	0Ω	10 Meg.	0Ω	250KΩ	250KΩ	*520KΩ	.2Ω	0Ω
V7	6V6GT	0Ω	0Ω	*400Ω	*120Ω	470KΩ	*520KΩ	.2Ω	400Ω
V8	SY3GT	Inf.	150KΩ	Inf.	115Ω	Inf.	110Ω	Inf.	150KΩ

*Measured From Pin 2 Of V8.

VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

© Howard W. Sams & Co., Inc. 1949



IF=455 KC AM

IF=10.7 MC FM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1949

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap fully closed and set pointer parallel with base of dial. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (Grid) of 6BA6 (V1). Low side to chassis. Do not connect to mixer grid as this will result in mis-alignment.	10.7MC (No. Mod.)	FM (Fully CCW)	Tuning gang fully open	DC Probe to Point (A) Common to chassis.	A1,A2, A3,A4, A5	Adjust for maximum deflection. Keep attenuating signal generator to give 1.5 volt reading.

2. (a) Reduce signal generator output to give VTVM reading of 1.5 volts.
(b) Tune signal generator above 10.7MC until VTVM reading is 1 volt.-Note generator frequency.
(c) Tune signal generator below 10.7MC until VTVM reading is 1 volt.-Note generator frequency.
(d) Add the signal generator frequencies obtained in (b) and (c) and divide the sum by 2. The result is the center frequency to be used in step 3 when aligning the discriminator transformer secondary.
(e) Tune the signal generator above and below 10.7MC and note the voltage reading on VTVM at different frequency points. If two peaks are obtained as per Fig. 3 and 4, note voltage reading of both peaks. If one peak is 20% higher than the other, it is necessary to realign the IF strip. A curve similar to Fig. 4 would necessitate realignment of the IF's. Fig. 5 and 6 show example response curves. Fig. 5 being incorrect response and Fig. 6 being correct.

3.	.001MFD	High side to pin 1 (Grid) of 6BA6 (V1). Low side to chassis.	Frequency obtained in step 2D.	FM	Tuning gang fully open	DC Probe to Point (B) Common to chassis.	A6	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	5000MMF	High side to pin 8 (Grid) of 6SB7Y (V2). Low side to chassis.	10.7MC (450KC Sweep)	FM	Tuning gang fully open	Vert.Amp. to Point (A) Low Side to chassis.	A1,A2, A3,A4, A5	Adjust for maximum amplitude and symmetry as per Fig 7.
2.	5000MMF	"	"	"	"	Vert.Amp. to Point (B) Low Side to chassis.	A6	Adjust A6 so crossover point occurs at center of pattern as per Fig 8. Slightly retouch A5 for maximum amplitude and straightness of crossover lines. Continue with step 4.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	300Ω carbon res.	Across FM ant. terminals with 300Ω in high side lead.	109MC	FM	Tuning gang fully open	DC Probe to Point (A) Common to chassis.	A7	Adjust for maximum deflection.
5.	300Ω carbon res.	"	102MC	"	Tune for maximum signal.	"	A8	"

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
6.	.1MFD	High side to pin 8 (Grid) of 6SB7Y (V2). Low side to chassis.	455KC	BC (center position)	Tuning gang fully open	Across voice coil	A9,A10 A11, A12	Adjust for maximum output.
7.	Direct	High side to Loop ant. terminal. Low side to chassis.	1620KC	"	"	"	A13	"
8.		Loop	1400KC	"	Tune for max. signal	"	A14	Place receiver in cabinet and connect loop. Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FIG.1

FIG.2

FIG.3

FIG.4

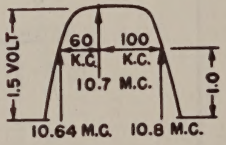


FIG.5

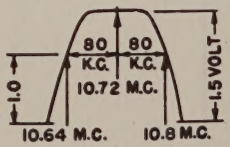


FIG.6

FIG.7

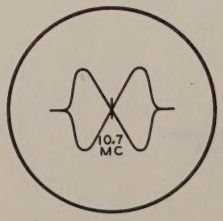
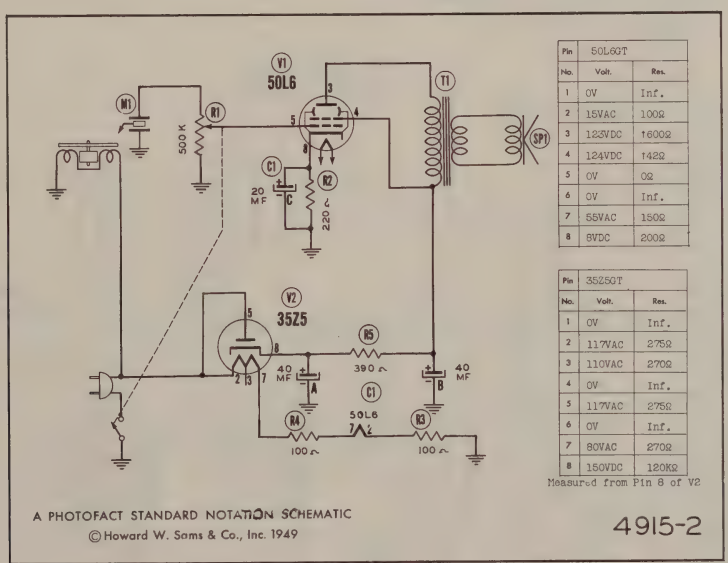


FIG.8

AIRCASTLE MODEL 15

TRADE NAME	Aircastle, Model 15
SUPPLIER	Spiegel, Inc., 1061 W. 35th St., Chicago, Illinois
TYPE SET	AC Operated Phono Player with 2 Tube Amplifier
TUBES (TWO)	Types 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING: .23 Amp. @ 117 Volts AC



Pin No.	50L6GT Volt.	Res.
1	0V	Inf.
2	15VAC	10Ω
3	123VDC	160Ω
4	124VDC	142Ω
5	0V	0Ω
6	0V	Inf.
7	55VAC	15Ω
8	8VDC	20Ω

Pin No.	35Z5GT Volt.	Res.
1	0V	Inf.
2	117VAC	27Ω
3	110VAC	27Ω
4	0V	Inf.
5	117VAC	27Ω
6	0V	Inf.
7	80VAC	27Ω
8	150VDC	120KΩ

Measured from Pin 8 of V2

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1949

4915-2

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Power Output	50L6GT	50L6GT	7AC	
V2	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	150		PRSA50502	EDL4415		DSB-305	TA-309	Filter Red Note
B	40	150			C				Filter Yellow
C	20	25							Output Cath. Byp. Green

Note. Some models use 30MFD in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½		Q13-133	M-60-Z	Volume control
B	Switch			76-1	SW-A	Attach to R1A Per Instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	IDENTIFICATION CODES
R2	220Ω	½		BTS-220	Output Cathode
R3	100Ω	5		AB-100	Filament Dropping
R4	100Ω	5		AB-100	Filament Dropping
R5	390Ω	1		BW-1-390	Filter

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: AIRCASTLE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T1	24002	2.92	160Ω	.5Ω		A-3332 ‡	RO-2 ‡	A-3025 ‡	‡ Bend mounting tabs down and mount on original bracket.

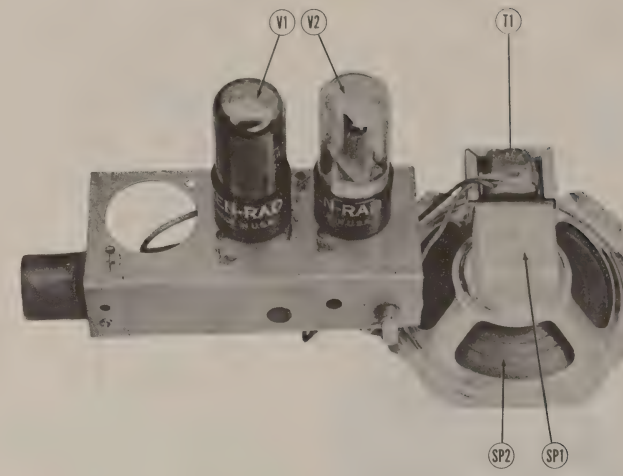
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
SP1	FIELD PM	V. C. IMP. 2.5Ω		ST-113 † MOD.P4-X	4A07 †	† Remount output transformer
SP2	CONE DIA. 3 7/8"	V. C. DIA. 9/16"				

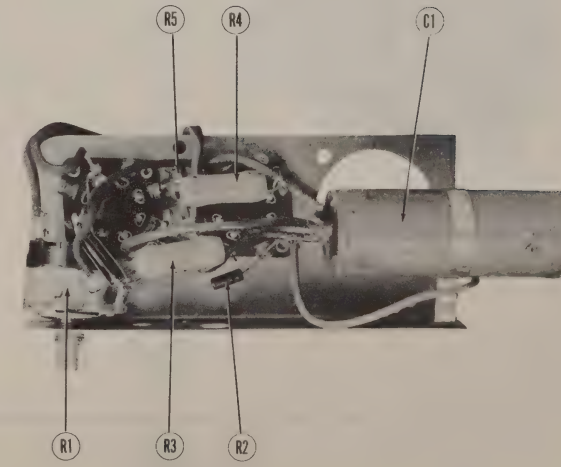
PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: AIRCASTLE PART No.	ASTATIC PART No.	REMARKS
M1A		510-L-72	Arm
B		M-22	Cartridge

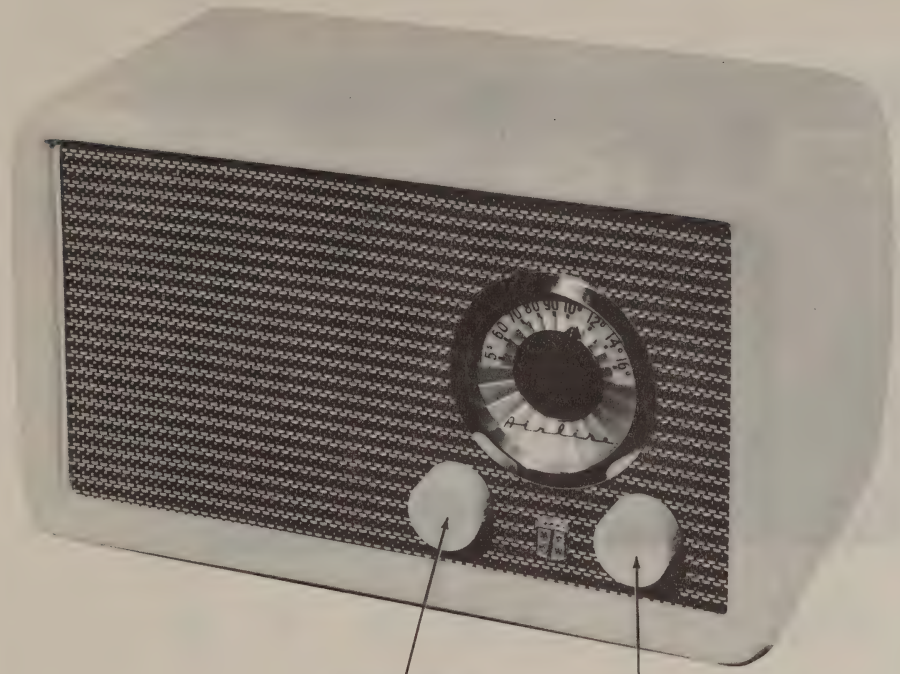
CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW



AIRLINE MODELS
94HA1527C, 94HA1528C



AIRLINE MODELS
94HA1527C, 94HA1528C

AIRLINE MODEL 94HA1528C

TRADE NAME	Airline, Models 94HA1527C, 94HA1528C
SUPPLIER	Montgomery Ward and Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types 12SA7 Converter, 12SK7 IF Amp., 12SQ7, DET.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap fully closed and set pointer parallel with base of dial. Use isolation transformer if available. If not connect a .1MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 5 (Osc. Grid) of 12SA7 (V1). Low side to B-.	455KC	1000KC	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1500KC	1500KC	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust of maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 8/49 4915-3 SET #67 FOLDER 3

PARTS LIST AND DESCRIPTIONS

AIRLINE MODEL 94HA1528C

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	12SA7	12SA7	8R	
V2	IF Amp.	12SK7	12SK7	8N	
V3	DET.-AVC-AF Amp.	12SR7	12SR7	9Q	
V4	Power Output	50L6GT	50L6GT	7AC	
V5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRLINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	80	150	45B151	PRSA150/50-	EDL5315		DSB-5030	TA-530	Filter Red
B	20	150		30			-150		Filter Yellow
C2	.05	600	46AY503J	P688-05	GT6S5		ST-6-05	TM-15	AVC Filter
C3	.01	600	46AZ103J	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	IF Decoupling
C4	155	500	CM20A101M	1468-00015	5W5T15	GP2K-150	M0.5-315	1FM-315	Diode RF Filter Note
C5	190	500	CM20A101M	1468-0002	5W5T2	GP2K-200	M0.5-32	1FM-32	" " " "
C6	.005	600	46AZ502J	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C7	.005	600	46AZ502J	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	" "
C8	.005	600	46AZ502J	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Output Plate Bypass
C9	.2	600	46AX204H	684-2	GT6P2		ST-6-2	72P53	Line Isolation
C10	.01	600	46BR103J6	P688-01	GT6S1		ST-6-01	TM-11	Line Filter

Note. Some models use 100 MMF in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	25B641	Q13-133	AM-60-Z	Volume control
B	Shaft		Not. Req.	Not Req.	KSS-3	Attach to R1A per instructions.
C	Switch		Not Req.	76-1	SW-A	" " " " "

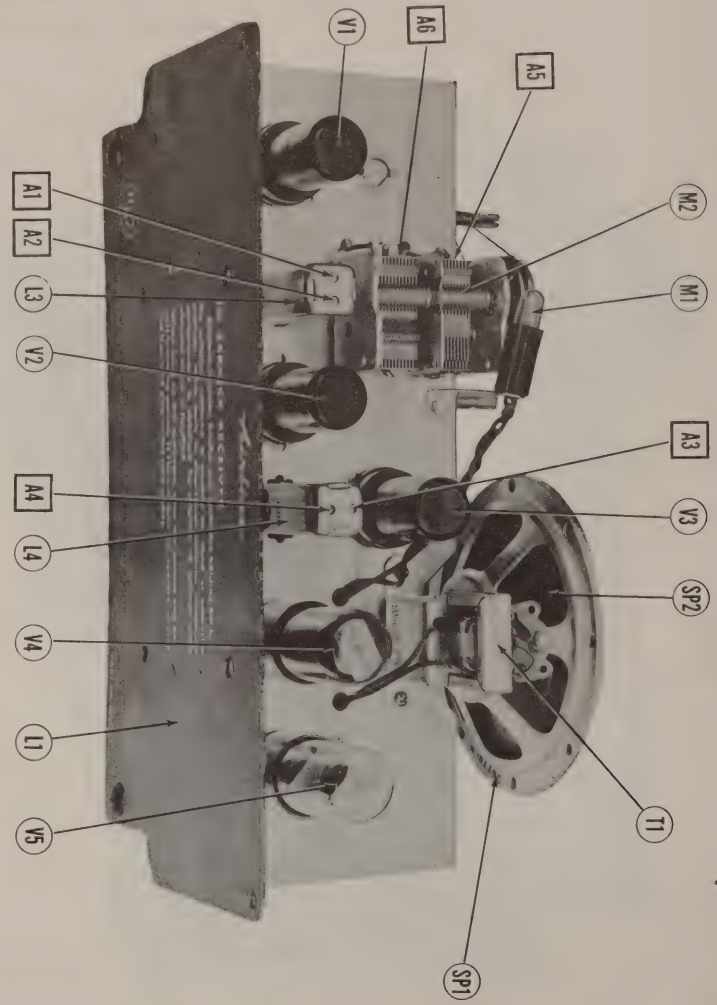
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	IDENTIFICATION CODES
R2	22KΩ	½	RC20AE223M	BTS-22K	Osc. Grid
R3	10KΩ	1	RC30AE103M	BTA-10K	1st IF Decoupling
R4	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	AVC Network
R5	47KΩ	½	RC20AE473M	BTS-47K	Diode Filter
R6	10 Meg.	½	RC20AE106M	BTS-10 Meg.	AF Grid
R7	470KΩ	½	RC20AE474M	BTS-470K	AF Plate
R8	470KΩ	½	RC20AE474M	BTS-470K	Output Grid
R9	150Ω	½	RC20AE151M	BW-½-150	Output Cathode
R10	2000Ω	1	RC30AE202M	BW-1-2200-5%	Filter -5%

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: AIRLINE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T1	2200Ω	3.1Ω	155Ω	.4Ω	Part of 85C073	A-3332	RO-1A †	A-3025 †	† Bend mounting tabs down and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: AIRLINE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-105§#		# Remount output transformer.
SP1	PM	3.1Ω	85C073	MOD.P5-X	5A1 #	§ Drill and tap magnet frame.
	CONE DIA.	V. C. DIA.				
SP2	4 3/4"	9/16"				

R F COILS

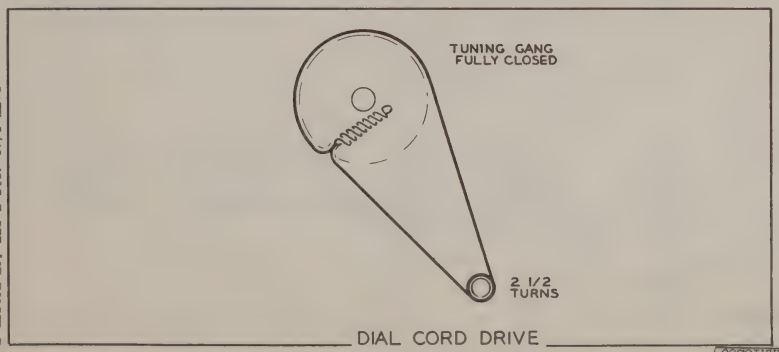
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: AIRLINE PART No.	MEISSNER PART No.	
L1	Loop Ant.	3Ω		57C119		
L2	Osc. Coil	6Ω		51B1058	14-1060*	* Add 50MMF from Osc. Grid to high side of tuning cap.
L3	Input IF	16Ω	16Ω	50B374		
L4	Output IF	16Ω	16Ω	50B374		

DIAL LIGHTS

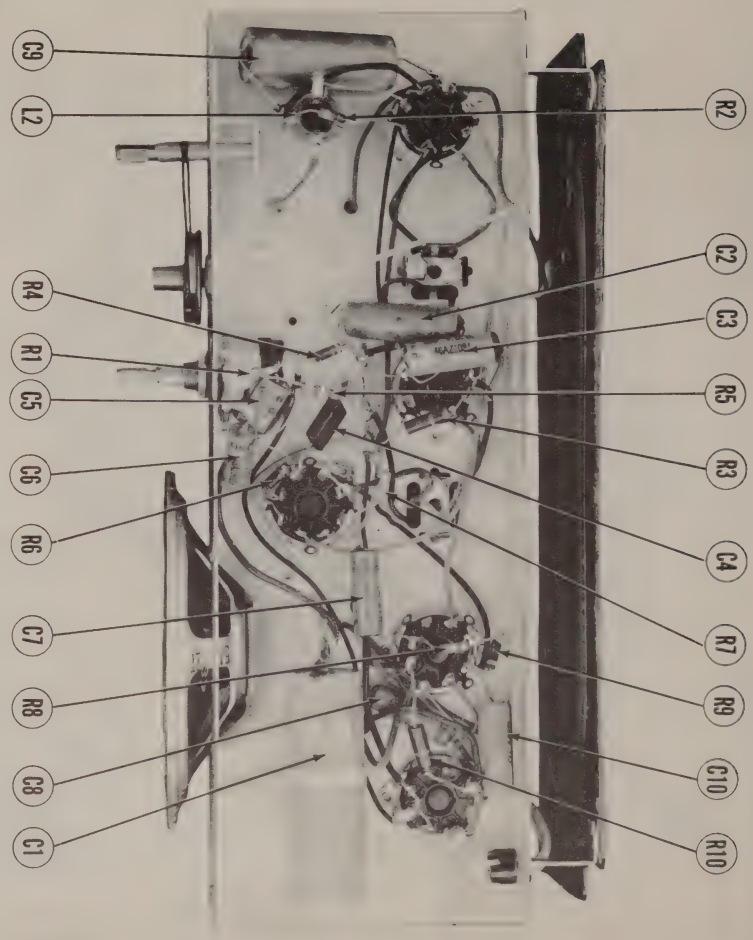
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: AIRLINE PART No.		NOTES
M1	Bayonet	6-8	.15	Brown			Type #47

MISCELLANEOUS

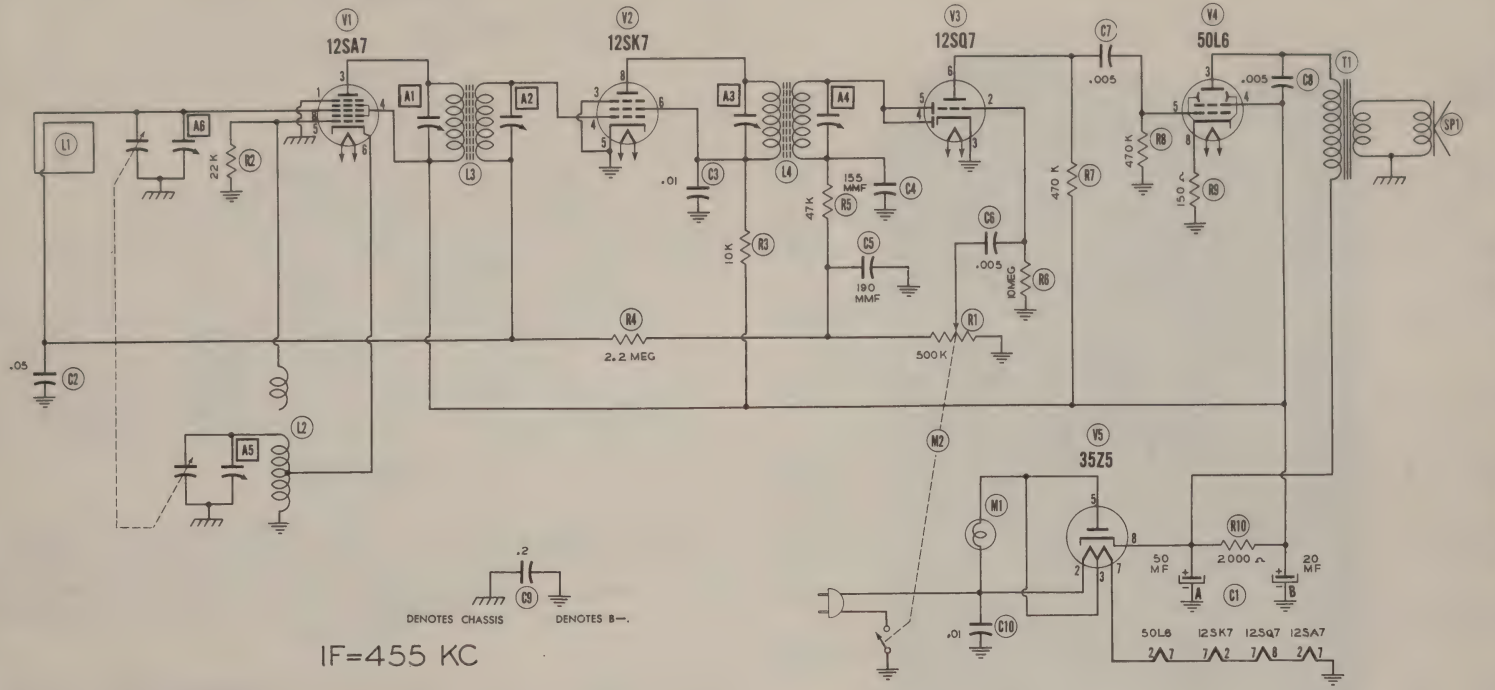
ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M2	2 Gang Var. Cap.	48B201	(23-502MMF, 30-235MMF)
	Dial Scale	220218	
	Dial Pointer	82B150	
	Knob	15B068-5	Ivory
	Knob	16B068-6	Brown
	Cabinet	66E450	Ivory
	Cabinet	66E450-1	Brown



CHASSIS—BOTTOM VIEW



DATE 8/49 4915-3 SET #67 FOLDER 3
AIRLINE MODEL 94HA1528C
AIRLINE MODEL 94HA1528C



IF=455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SA7	0V	12VAC	85VDC	85VDC	§-9.4VDC	0V	0V	-.6VDC
V 2	12SK7	0V	24VAC	0V	-.6VDC	0V	45VDC	37VAC	45VDC
V 3	12SQ7	0V	-.7VDC	0V	-.4VDC	-.4VDC	45VDC	24VAC	12VAC
V 4	50L6GT	0V	37VAC	115VDC	85VDC	0V	0V	85VAC	5.8VDC
V 5	35Z5GT	0V	117VAC	112VAC	0V	112VAC	0V	85VAC	125VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SA7	Inf.	13Ω	†2000Ω	†2000Ω	22KΩ	.5Ω	0Ω	3 Meg.
V 2	12SK7	Inf.	25Ω	0Ω	3 Meg.	0Ω	†12KΩ	38Ω	†12KΩ
V 3	12SQ7	Inf.	10 Meg.	0Ω	550KΩ	550KΩ	†470KΩ	25Ω	13Ω
V 4	50L6GT	0Ω	85Ω	†170Ω	†2000Ω	470KΩ	Inf.	38Ω	150Ω
V 5	35Z5	Inf.	120Ω	115Ω	0Ω	115Ω	Inf.	85Ω	170KΩ

†Measured From Pin 8 Of V5.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1949

4915-3

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

AUTOMATIC
MODEL M-90

AUTOMATIC
MODEL M-90

AUTOMATIC MODEL M-90

TRADE NAME	Automatic, Model M-90
MANUFACTURER	Automatic Radio Mfg., Co., Inc., 122 Brookline Ave., Boston 15, Mass.
TYPE SET	Battery Operated Universal Automotive Superheterodyne Receiver
TUBES(SIX)	Types 6BA6 RF Amp., 6BE6 Converter, 6BA6 IF Amp., 6AT6 DET.-AVC-AF, 6AQ5 Power Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery RATING: 5.6 Amp. @ 6 Volts DC
TUNING RANGE—BROADCAST	540-1560KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 7 (Grid) of 6BE6 (V2). Low side to chassis.	455KC	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	50MMF	High side to ant. receptacle. Low side to chassis.	1560KC	"	"	A5	" " " "
3.	50MMF	"	1400KC	Tune for max. signal	"	A6, A7	" " " "

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

AUTOMATIC MODEL M-90

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AUTOMATIC PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amp.	6BA6	6BA6	7BK	
V4	DET.-AVC-AF	6AT6	6AT6	7BT	
V5	Power Output	6AQ5	6AQ5	7BZ	
V6	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AUTOMATIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	20	350	CE-86	AF64H4A	UP15D35				■ Filter
B	20	350			BR202A				▲ Filter
C	20	25							Output Cath. Bypass
C2	.05	200		P288-05	GT2S5		TST-2-05	68P16	AVC Filter
C3	.05	200		P288-05	GT2S5		TST-2-05	68P16	RF Decoupling
C4	.05	200		P288-05	GT2S5		TST-2-05	68P16	" " Note 1
C5	.05	200		P288-05	GT2S5		TST-2-05	68P16	AVC Filter
C6	100			1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Osc, Grid Cap.
C7	200			1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Diode RF Filter
C8	.006	400					TST-6-006	68P6	Audio Coupling
C9	200			1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	AF Plate Bypass
C10	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C11	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Output Plate Bypass
C12	.008	1600		P1688-008	GT16D8		STM-16-008	MB-28	Buffer
C13	.25	400		P488-25	GT4P25		ST-4-25	68P22	Hash Filter Note 2
C14	.5	100						68P20	" "

Note 1. Some models use .5 MFD in this application.
Note 2. Not used in all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AUTOMATIC PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	750KΩ	½	RV-57			Volume control and switch

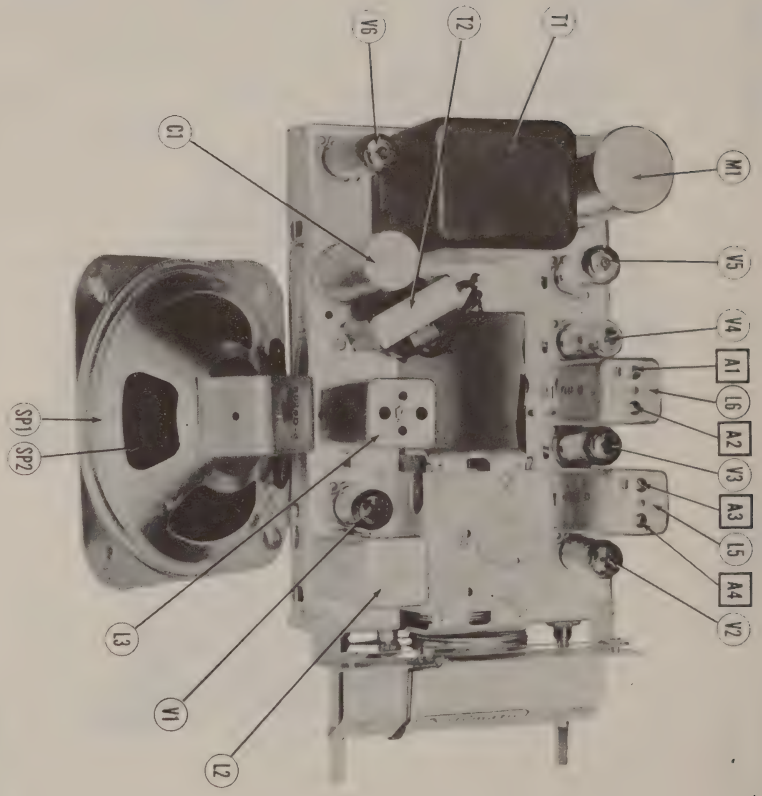
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AUTOMATIC PART No.	IRC PART No.	IDENTIFICATION CODES
R2	22KΩ	2		BT-2-22K	Screen Dropping
R3	1 Meg.	1		BTA-1 Meg.	AVC Network
R4	20KΩ	½		BTS-22K	Osc. Grid
R5	2700Ω	½		BTS-2700	IF Cathode
R6	2 Meg.	½		BTS-2.2 Meg.	AVC Network
R7	10 Meg.	½		BTS-10 Meg.	AF Grid
R8	250KΩ	½		BTS-270K	AF Plate
R9	680KΩ	½		BTS-680K	Output Grid
R10	330Ω	½		BW-½-330	Output Cathode
R11	1000Ω	1		BW-1-1000	Filter
R12	100Ω	½		BW-½-100	Hash Suppression
R13	100Ω	½		BW-½-100	Hash Suppression

TRANSFORMER (VIBRATOR)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: AUTOMATIC PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	6VDC	510VCT .044ADC			TV-86		VT-1	P-4078

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AUTOMATIC PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	5100Ω	3.2Ω	350Ω	.5Ω	TO-86	A-3877	RO-301	A-2930	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			AUTOMATIC PART No.	JENSEN PART No.	QUAM PART No.	
SP1	FIELD	V. C. IMP.		ST-803 MOD.P525V	52A1	
	PM	3.3Ω				
SP2	CONE DIA.	V. C. DIA.				
	5 1/4"	9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	AUTOMATIC PART No.	MEISSNER PART No.	
L1	Ant. Choke	1.2Ω				
L2	RF Coil	85Ω	5.2Ω	57FB-4		
L3	RF Coil	85Ω	5.2Ω	57FB-4		
L4	Osc. Coil	4Ω	.5Ω			
L5	Input IF	36Ω	36Ω	1455-16		
L6	Output IF	36Ω	36Ω	1455-16		
L7	Hash Choke	0Ω				
L8	Hash Choke	0Ω				

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA			INSTALLATION NOTES
				AUTOMATIC PART No.	CORNELL-DUBILIER PART No.	RADIART PART No.	
M1	Int.	6V	115∿	V-83	C-01	5301	

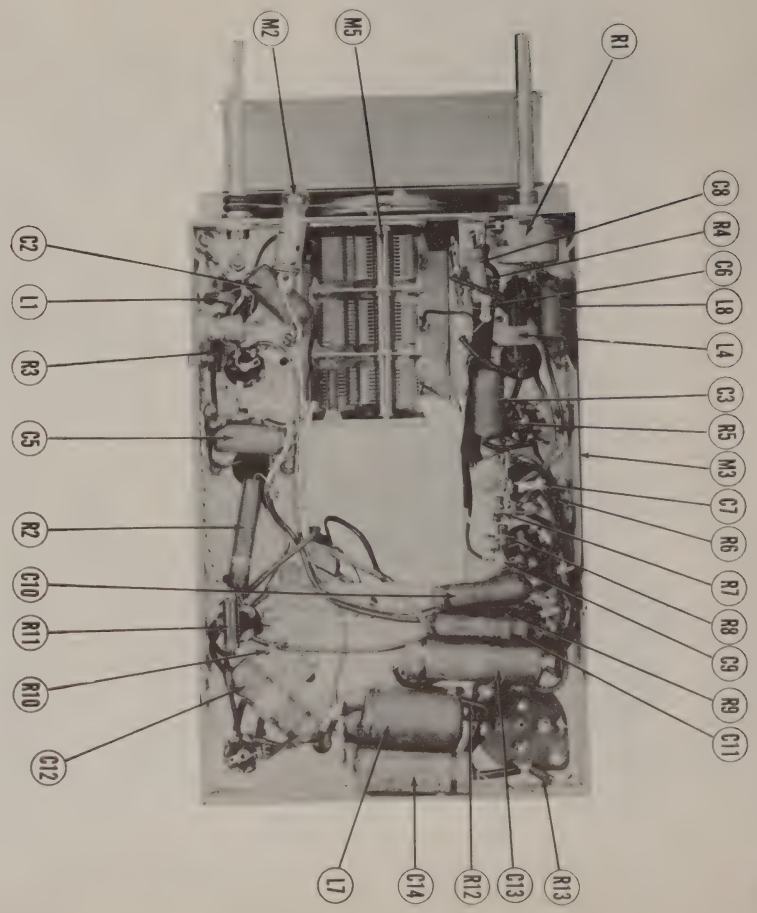
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					AUTOMATIC PART No.		
M2	Bayonet	7.5	.2	White			Type #51

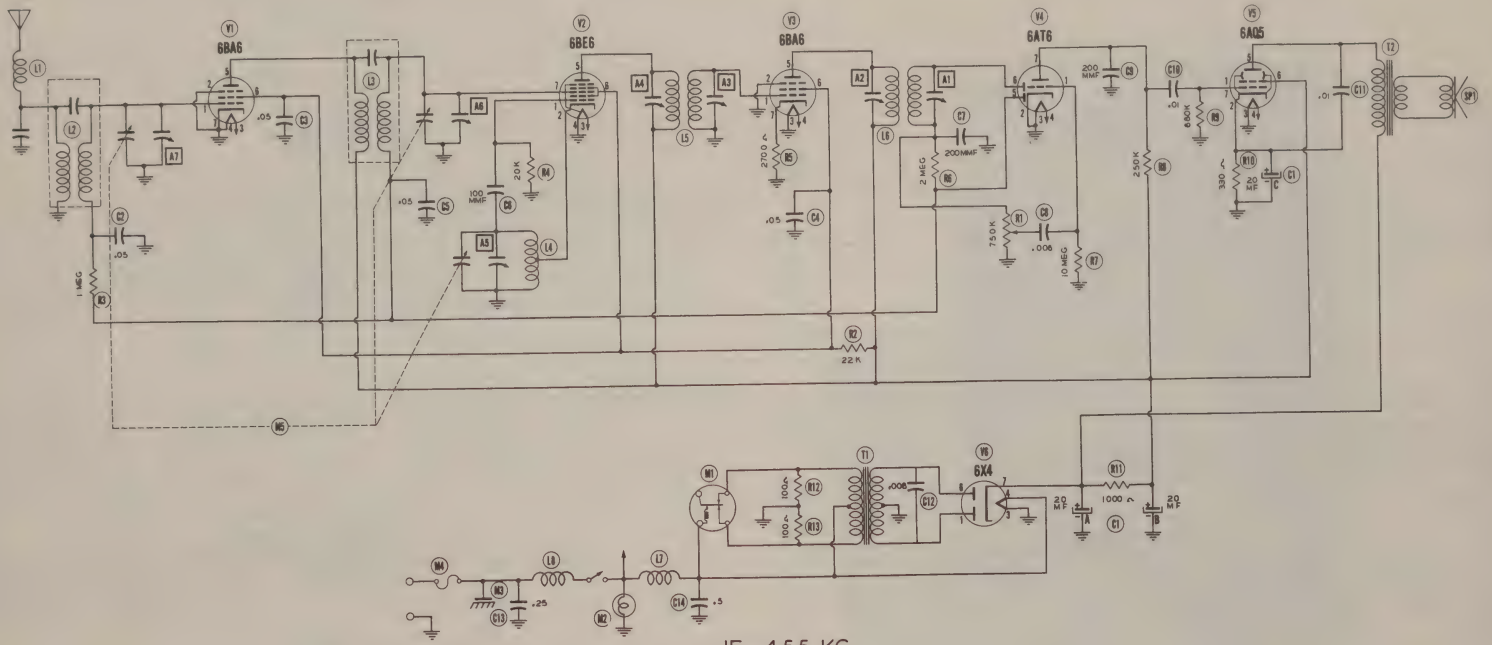
MISCELLANEOUS

ITEM No.	PART NAME	AUTOMATIC PART No.	NOTES
M3	Spark Plate		
M4	Fuse		15 Amp.
M5	3 Gang Var. Cap.	CV-148	(23-387MMF, 23-387MMF, 40-204MMF)

CHASSIS—BOTTOM VIEW



AUTOMATIC MODEL M-90



IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	-.6VDC	0V	6.3VDC	0V	210VDC	62VDC	0V
V 2	6BE6	1.5-2 VDC	0V	6.3VDC	0V	210VDC	62VDC	-.2VDC
V 3	6BA6	0V	0V	6.3VDC	0V	210VDC	62VDC	3.8VDC
V 4	6AT6	-.5VDC	0V	6.3VDC	0V	-.2VDC	-.1VDC	73VDC
V 5	6AQ5	0V	11VDC	6.3VDC	0V	220VDC	210VDC	0V
V 6	6X4	150VAC	0V	6.3VDC	0V	0V	250VAC	230VDC

†TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

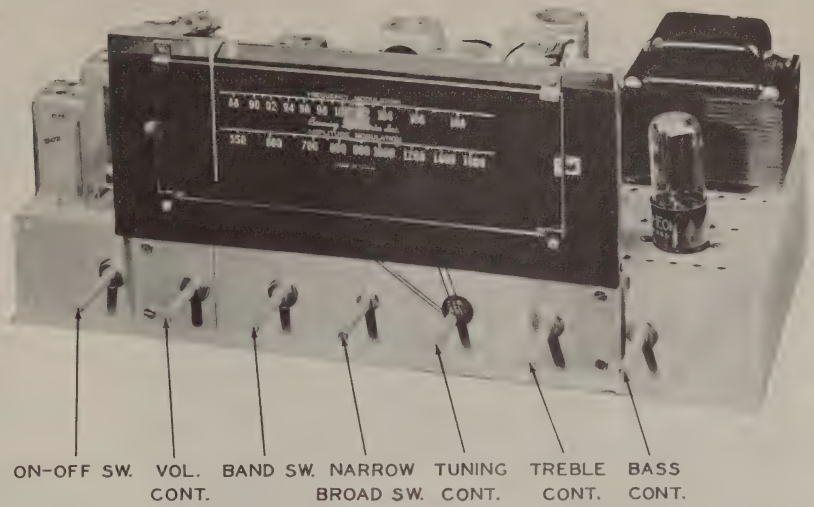
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	3.7 Meg	0Ω	.1Ω	0Ω	†1000Ω	†23KΩ	0Ω
V 2	6BE6	20KΩ	.1Ω	.1Ω	0Ω	†1000Ω	†23KΩ	2.7 Meg
V 3	6BA6	36Ω	0Ω	.1Ω	0Ω	†1000Ω	†23KΩ	2.7KΩ
V 4	6AT6	10 Meg.	0Ω	.1Ω	0Ω	2.7 Meg	750KΩ	†250KΩ
V 5	6AQ5	680KΩ	330Ω	.1Ω	0Ω	†320Ω	†100Ω	680KΩ
V 6	6X4	380Ω	Inf.	.1Ω	0Ω	Inf.	360Ω	50KΩ

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949

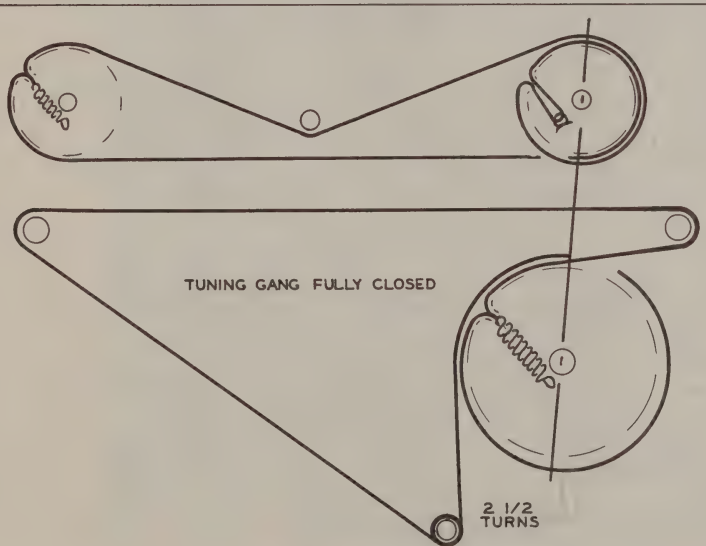
4915-4

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum no signal applied for voltage measurements.



BROWNING MODEL RJ-20

TRADE NAME	Browning, Models RJ-20, RJ-22
MANUFACTURER	Browning Laboratories, Inc., Winchester, Mass.
TYPE SET	AC Operated AM-FM Superheterodyne Tuner
TUBES(FOURTEEN)	Types 6AU6 FM RF Amp., 7F8 FM Converter, 6AU6 FM 1st IF Amp., 6AU6 FM 2nd IF Amp., 6AU6 FM 1st Limiter, 6AU6 FM 2nd Limiter, 6AL5 FM Discriminator, 6SG7 AM RF Amp., 6SA7 AM Converter, 6SK7 AM IF Amp., 6AL5 AM DET-AVC, 6AL7GT Tuning Eye, 12AU7 AF Amp., 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC — RATING: .73 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC — FREQ. MOD. 88-108MC

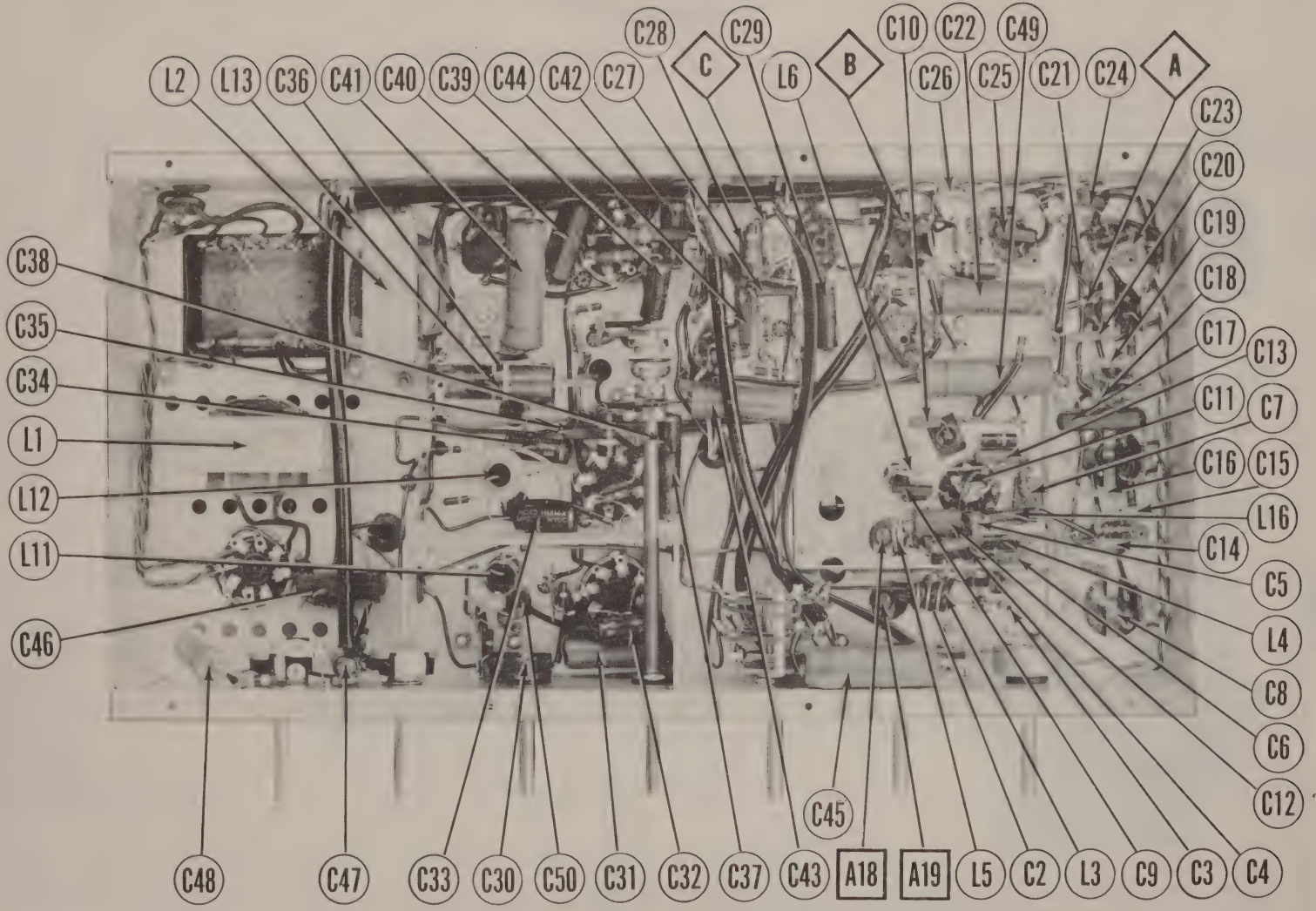


DIAL CORD DRIVE

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 8/49 4915-5 SET #67 FOLDER #5


C28
C29
C10
C22
C49
L2
L13
C36
C41
C40
C39
C44
C42
C27
C
L6
B
C26
C25
C21
C24
A
C23
C20
C38
C19
C35
C18
C34
C17
C13
L1
C11
C7
L12
C16
C15
L11
L16
C14
C5
C46
L4
C8
C6
C12
C45
C48
C47
C33
C30
C50
C31
C32
C37
C43
A18
A19
L5
C2
L3
C9
C3
C4

R10
R11
R13
R12
R14
M5
R15
R16
R19
R46
R17
R47
R44
R45
R49
R43
R54
R42
R40
R41
R55
R35
R38
R37
R39
R36
R34
R33
R56
R32
R26
R31
R30
R27
R29
R24
R28
R48
R23
M6
R22
R21
R1
R25
R53
M4
R18
R9
R5
R6
R4
R2
R50
R52
R51
R8
R7
R3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: BROWNING PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	FM RF Amp.		6AM6	7BK	
V2	FM Converter		7F8	8BW	
V3	FM 1st IF Amp.		6AU6	7BK	
V4	FM 2nd IF Amp.		6AU6	7BK	
V5	FM 1st Limiter		6AU6	7BK	
V6	FM 2nd Limiter		6AU6	7BK	
V7	FM Disc.		6AL5	6BT	
V8	AM RF Amp.		6BG7	8BK	
V9	AM Converter		6SA7	8R	
V10	AM IF Amp.		6SK7	8N	
V11	AM DET-AVC		6AL5	6BT	
V12	Tuning Ind.		6AL7GT	8CH	
V13	AF Amp.		12AU7	9A	
V14	Rectifier		5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BROWNING PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450		AF88J4A	UP		DY-314	EL-424*	▰Filter
B	40	450			4445C				■Filter
C	20	25							▲AF Cath. Bypass
C2	50	500							RF Coupling
C3	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter Note 1
C4	470	500		1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	FM RF Screen Bypass
C5	100	500		1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C6	1000	500		1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	FM RF Decoupling Note 1
C7	1000	500		1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	FM Mixer Cath. Bypass
C8	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM Mixer Plate Dec. Note 2
C9	25	500		1468-000025	5W5Q25	GP1K-25	MO.5-425	MS-425	FM Osc. Grid Cap
C10	30	500			SR5Q3		MS8.5-43	MS-43	Fixed Padder
C11	5			1468-000005	5W5V5	NP0K-5	MO.5-55	MS-55	Osc. Coupling
C12	470	500		1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	Filament Bypass
C13	1000	500		1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Osc. Plate Bypass
C14	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM 1st IF Cath. Bypass
C15	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM 1st IF Screen Bypass
C16	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM 1st IF Decoupling
C17	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	RF Bypass
C18	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM 2nd IF Cath. Bypass
C19	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM 2nd IF Screen Bypass
C20	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM 2nd IF Decoupling
C21	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	AVC Filter
C22	.05	600		P688-05	GT6S5		ST-6-05	TM-15	AVC Filter
C23	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st Limiter Screen Bypass
C24	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	IF Coupling Note 3
C25	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	2nd Limiter Screen Byp.
C26	4700			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd Limiter Plate Dec.
C27	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Bypass
C28	1000	500		1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	De-emphasis
C29	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Tuning Ind. Filter
C30	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	AVC Filter
C31	.05	600		P688-05	GT6S5		ST-6-05	TM-15	AM RF Cath. Bypass
C32	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	AM RF Screen Bypass
C33	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	AM RF Plate Dec.
C34	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	AVC Filter
C35	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap
C36	5					N750K-5			Fixed Trimmer
C37	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Osc. Anode Bypass
C38	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Conv. Plate Dec.
C39	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	AVC Filter
C40	.1	400		P488-1	GT4P1		ST-4-1	TM-1	AM IF Cath. Bypass
C41	.1	600		P688-1	GT6P1		ST-6-1	TM-1	AM IF Screen Bypass
C42	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	AM IF Decoupling
C43	.05	600		P688-05	GT6S5		ST-6-05	TM-15	AVC Filter
C44	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Diode Filter

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BROWNING PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R48	2.2KΩ	½		BTS-2200	1st AF Cathode
R49	100KΩ	½		BTS-100K	1st AF Plate Load
R50	100KΩ	½		BTS-100K	Tone Compensation
R51	3.6KΩ	½		BTS-3.3K	Tone Compensation
R52	15KΩ	½		BTS-15K	Tone Compensation
R53	2.2KΩ	½		BTS-2200	2nd AF Cathode
R54	22KΩ	½		BTS-22K	2nd AF Plate Load
R55	100KΩ	½		BTS-100K	Audio Output Shunt
R56	2.2 Meg.	½		BTS-2.2 Meg.	AVC Network

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: BROWNING PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.
T1	117VAC @ .73A	720VCT .083A DC	5VAC @ 2A	6.3VAC @ 4.1A		P-6014	PH-90#	P-2954

#Drill New Mounting Holes.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ↶)	REPLACEMENT DATA: BROWNING PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
L1	.083A	235Ω	8.8H		C-1709	R-885	C-2990	
L2	.083A	235Ω	8.8H		C-1709	R-885	C-2990	

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: BROWNING PART No.	REPLACEMENT DATA: MEISSNER PART No.
L3	FM Ant.Coil	0Ω	0Ω		
L4	FM RF Plate Choke	0Ω			
L5	FM RF Coil	0Ω			
L6	FM Osc.Coil	0Ω			
L7	FM 1st IF	.1Ω	.1Ω		
L8	FM 2nd IF	.1Ω	.1Ω		
L9	FM 3rd IF	.1Ω	.1Ω		
L10	Disc. Trans	1Ω	.5Ω		
L11	AM Ant.Coil	4Ω	9Ω		
L12	AM RF Trans	15Ω	4Ω		
L13	AM Osc.Coil	9Ω	2.5Ω		14-1060
L14	AM 1st IF	15.5Ω	15.5Ω		16-5712
L15	AM 2nd IF	15.5Ω	15.5Ω		16-5714
L16	Filament Choke	1Ω			

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: BROWNING PART No.	REPLACEMENT DATA:	NOTES
M1	Bayonet	6-8V	.15A	Brown			Type #47
M2	Bayonet	6-8V	.15A	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	BROWNING PART No.	NOTES
M3	AM Tuning Gang		3 Section
M4	FM Tuning Gang		3 Section
M5	Switch		Band
M6	Switch		Narrow-Broad

PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA BROWNING PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C45	.1	600		P698-1	GT6P1		ST-6-1	TM-1	Audio Coupling
C46	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Audio Coupling
C47	.005	600		P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Tone Compensation
C48	.05	600		P698-05	GT6S5		ST-6-05	TM-15	Tone Compensation
C49	.1	600		P698-1	GT6P1		ST-6-1	TM-1	Audio Coupling
C50	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Ant. Coupling Note 1

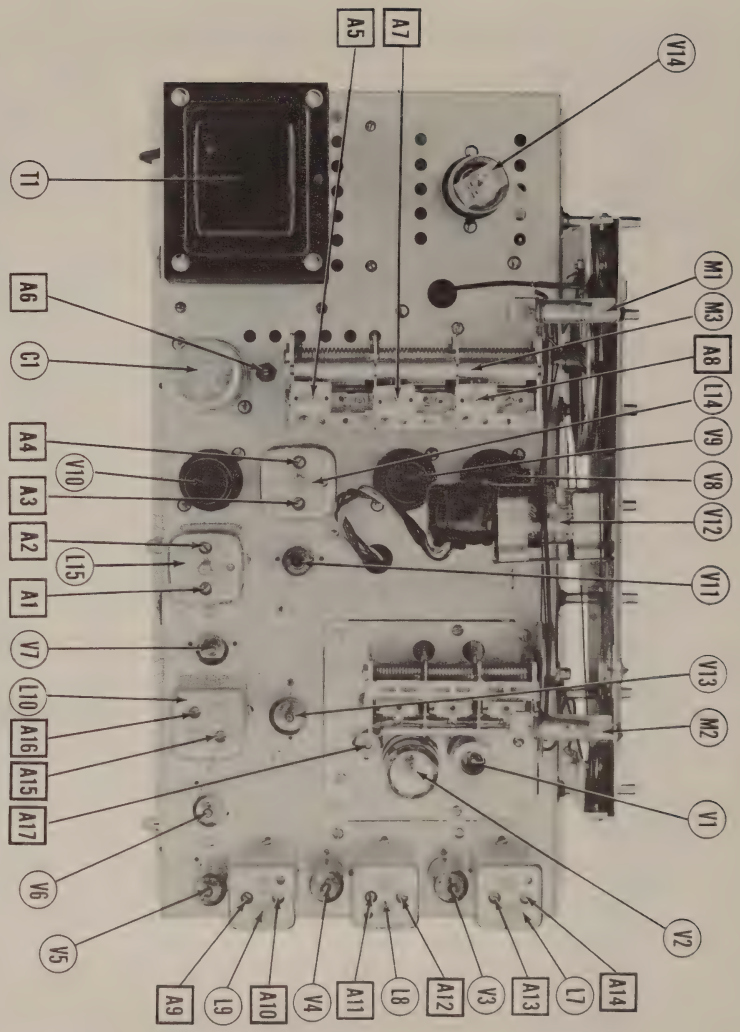
*Parallel Sections To Obtain Desired Capacity.
Note 1. Not Used In All Models.
Note 2. Some Models Use 1000MMF In This Application.
Note 3. Some Models Use 22MMF In This Application.

CONTROLS

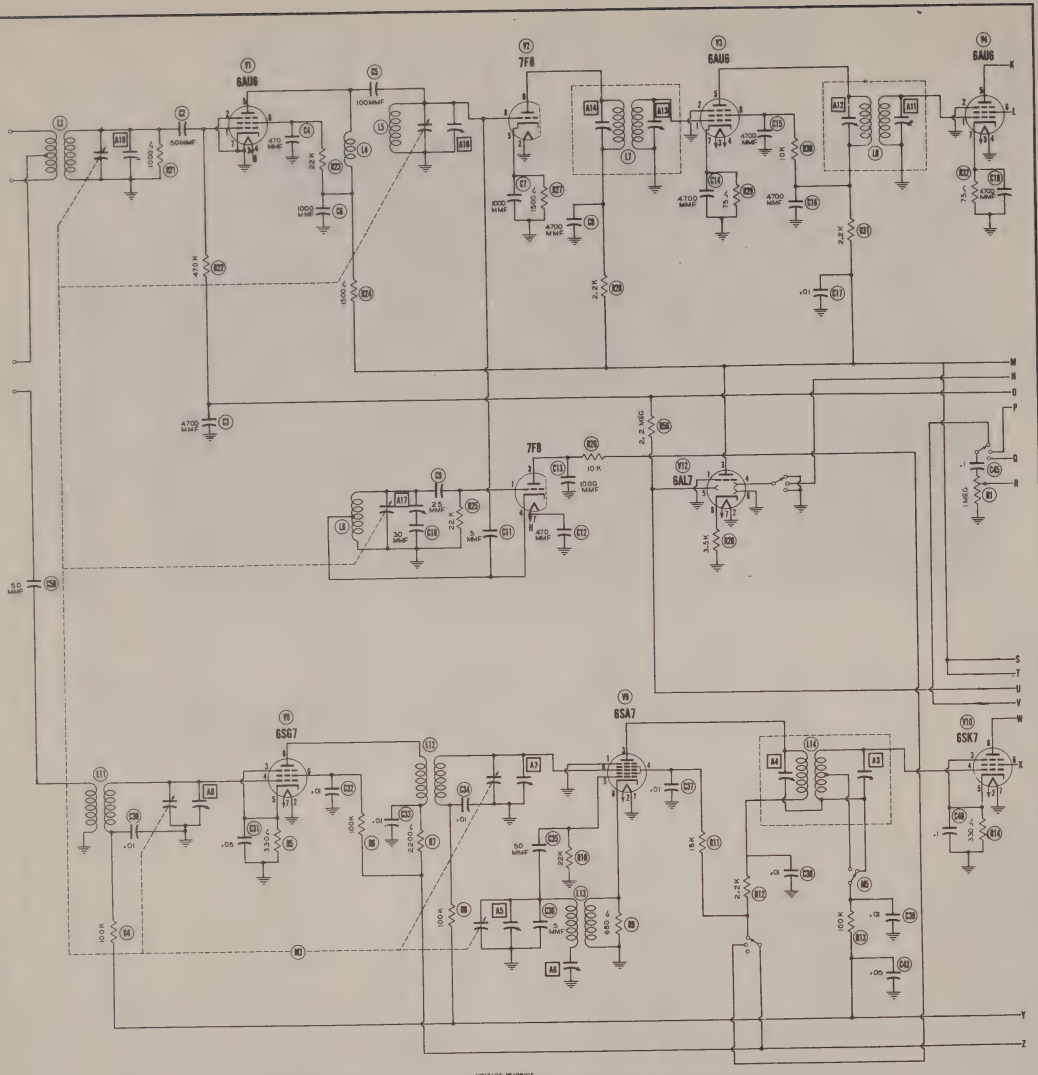
ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA BROWNING PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	1 Meg.	½		Q13-137	M-63-Z	Volume control
R2	1 Meg.	½		Q13-137	M-63-Z	Treble control
R3	100KΩ	½		Q13-128	M-51-Z	Bass control

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA BROWNING PART No.	IRC PART No.	IDENTIFICATION CODES
R4	100KΩ	½		BTS-100K	AVC Network
R5	330Ω	½		BW-½-330	AM RF Cathode
R6	100KΩ	½		BTS-100K	AM RF Screen Dropping
R7	2200Ω	½		BTS-2200	AM RF Plate Decoupling
R8	100KΩ	½		BTS-100K	AVC Network
R9	680Ω	½		BTS-680	AM Conv. Cathode
R10	22KΩ	½		BTS-22K	AM Osc. Grid
R11	18KΩ	½		BT-2-18K	AM Conv. Screen
R12	2.2KΩ	½		BTS-2200	AM Plate Decoupling
R13	100KΩ	½		BTS-100K	AVC Network
R14	330Ω	½		BW-½-330	AM IF Cathode
R15	75KΩ	1		BTA-82K	AM IF Screen Dropping
R16	2.2KΩ	½		BTS-2200	AM IF Decoupling
R17	22KΩ	½		BTS-22K	Diode Filter
R18	2.2KΩ	½		BTS-2200	AVC Network
R19	470KΩ	½		BTS-470K	Diode Load
R20	3.5KΩ	½		BTS-3300	Tuning Eye Cathode
R21	1000Ω	½		BTS-1000	FM Ant. Coil Shunt
R22	470KΩ	½		BTS-470K	AVC Network
R23	22KΩ	1		BTA-22K	FM RF Screen
R24	1500Ω	½		BTS-1500	FM RF Decoupling
R25	22KΩ	½		BTS-22K	FM Osc. Grid
R26	10KΩ	1		BTA-10K	FM Osc. Plate Load
R27	1500Ω	½		BTS-1500	FM Mixer Cathode
R28	2.2KΩ	½		BTS-2200	FM Mixer Plate Decoupling
R29	75Ω	½			FM 1st IF Cathode
R30	10KΩ	½		BTS-10K	FM 1st IF Screen Dropping
R31	2.2KΩ	½		BTS-2200	FM 1st IF Decoupling
R32	75Ω	½			FM 2nd IF Cathode
R33	10KΩ	½		BTS-10K	FM 2nd IF Screen Dropping
R34	2.2KΩ	½		BTS-2200	FM 2nd IF Decoupling
R35	56KΩ	½		BTS-56K	1st Limiter Grid
R36	1 Meg.	½		BTS-1 Meg.	AVC Network
R37	100KΩ	1		BTA-100K	1st Limiter Screen Dropping
R38	27KΩ	½		BTS-27K	Voltage Divider
R39	10KΩ	½		BTS-10K	1st Limiter Plate Load
R40	27KΩ	½		BTS-27K	2nd Limiter Grid
R41	100KΩ	½		BTS-100K	2nd Limiter Screen Dropping
R42	100KΩ	½		BTS-100K	Voltage Divider
R43	100KΩ	½		BTS-100K	2nd Limiter Plate Decoupling
R44	100KΩ	½		BTS-100K	Diode Load
R45	100KΩ	½		BTS-100K	Diode Load
R46	75KΩ	½		BTS-82K	De-emphasis
R47	1 Meg.	½		BTS-1 Meg.	Tuning Eye Network



DATE 8/49 4915-S SET #67 FOLDER #5



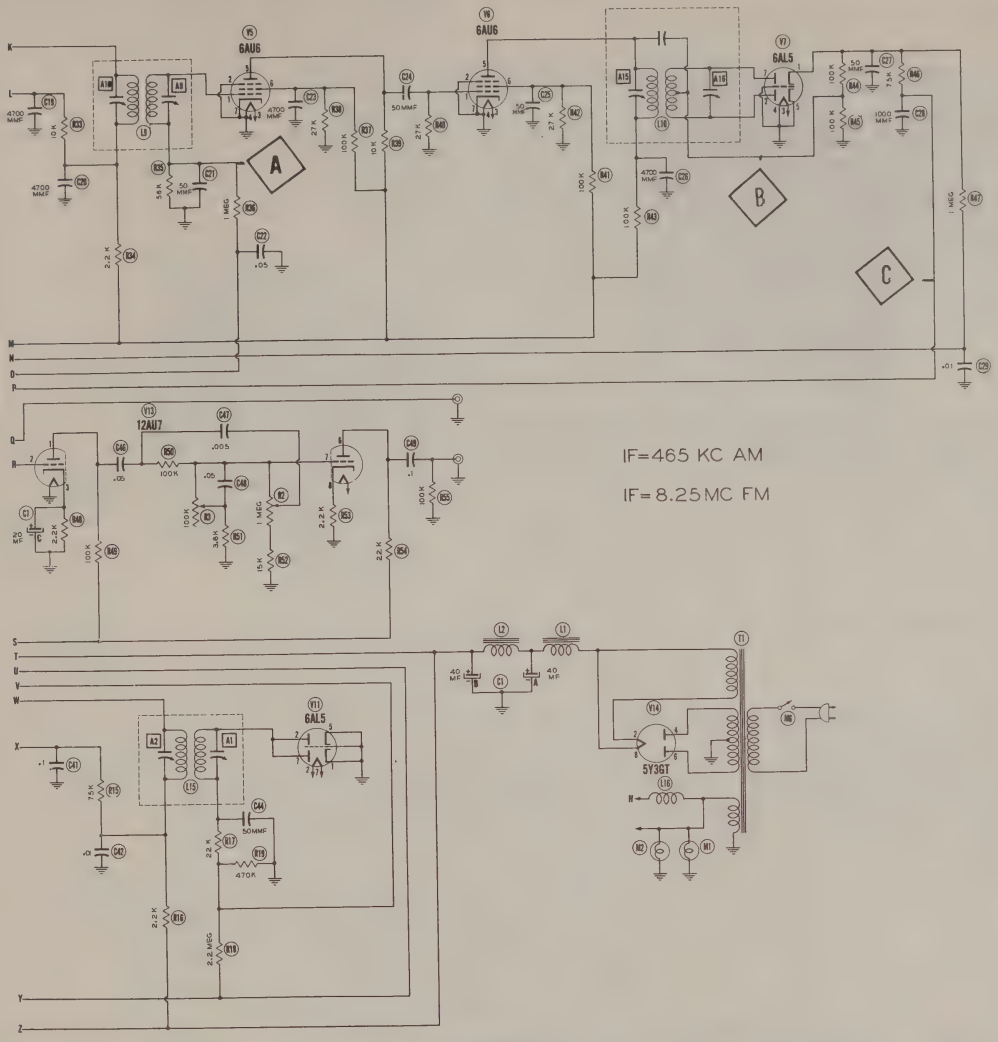
VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
#V1	6AU6	0V	0V	0V	6.3VAC	240VDC	140VDC	0V		
#V2	7F8	½-.4VDC	0V	187VDC	0V	5.6VDC	250VDC	6.3VAC		
#V3	6AU6	0V	0V	6.3VAC	0V	225VDC	175VDC	1.2VDC		
#V4	6AU6	0V	0V	6.3VAC	0V	225VDC	175VDC	1.2VDC		
#V5	6AU6	-.4VDC	0V	6.3VAC	0V	240VDC	45VDC	0V		
#V6	6AU6	-.4VDC	0V	6.3VAC	0V	185VDC	45VDC	0V		
#V7	6AL5	-2VDC	-.7VDC	6.3VAC	0V	0V	0V	-9.2VDC		
V 8	6SQ7	1.1VDC	0V	1.1VDC	-1VDC	1.1VDC	145VDC	6.3VAC	245VDC	
V 9	6SA7	0V	6.3VAC	245VDC	80VDC	½-.8VDC	0V	0V	-1.7VDC	
V 10	6SK7	0V	0V	1.8VDC	-1VDC	1.8VDC	112VDC	6.3VAC	245VAC	
V 11	6AL5	0V	-.8VDC	6.3VAC	0V	0V	0V	-.8VDC		
V 12	6AL7GT	0V	0V	245VDC	0V	-1.8VDC	0V	6.3VDC	1VDC	
V 13	12AU7	87VDC	0V	3.9VDC	0V	0V	167VDC	0V	6.3VDC	6.3VAC
V 14	5Y3GT	270VDC	300VDC	0V	350VAC	0V	350VAC	0V	300VDC	

‡TAKEN WITH VACUUM TUBE VOLTMETER.
‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

© Howard W. Sams & Co., Inc. 1949



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
#V1	6AU6	2 Meg.	0Ω	0Ω	.1Ω	1.5Ω	12ΔKΩ	0Ω		
#V2	7F8	22KΩ	0Ω	110KΩ	0Ω	15KΩ	12.8KΩ	.2Ω	0Ω	
#V3	6AU6	.1Ω	0Ω	.1Ω	1Ω	12.8KΩ	113KΩ	75Ω		
#V4	6AU6	.1Ω	0Ω	.1Ω	0Ω	12.8KΩ	113KΩ	75Ω		
#V5	6AU6	56KΩ	0Ω	.1Ω	0Ω	111KΩ	160KΩ	0Ω		
#V6	6AU6	27KΩ	0Ω	.1Ω	0Ω	114.8KΩ	165KΩ	0Ω		
#V7	6AL5	20KΩ	110KΩ	.1Ω	0Ω	0Ω	0Ω	100KΩ		
V 8	6BD7	330Ω	0Ω	330Ω	1.5 Meg	330Ω	1100KΩ	.1Ω	12.8KΩ	
V 9	6BA7	0Ω	.1Ω	12.8KΩ	110KΩ	22KΩ	2.5Ω	0Ω	1.5 Meg	
V 10	6BK7	0Ω	0Ω	330Ω	1.5 Meg	330Ω	175KΩ	.1Ω	12.8KΩ	
V 11	6AL5	0Ω	570KΩ	.1Ω	0Ω	0Ω	0Ω	570KΩ		
V 12	6AL7GT	0Ω	0Ω	146ΩΩ	0Ω	1.5 Meg	125KΩ	.1Ω	3.5KΩ	
V 13	12AU7	1100KΩ	3Ω	2.2KΩ	0Ω	0Ω	125KΩ	3KΩ	2.2KΩ	.1Ω
V 14	5Y3GT	35KΩ	35KΩ	Inf.	50Ω	Inf.	54Ω	Inf.	35KΩ	

*Measured From Pin 8 Of V14.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer, turn the tuning gang fully closed and set the pointer at the left hand edge of the dial calibration base line.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 8 (Grid) of 6SA7 (V9). Low side to chassis.	465KC	AM	Tuning gang fully open	Across output jack.	A1,A2, A3,A4	Adjust for maximum output.
2.	250MMF	High side to AM antenna terminal. Low side to chassis.	1500KC	"	1500KC	"	A5	"
3.	250MMF	"	600KC	"	600KC	"	A6	Rock tuning gang and adjust for maximum output. Repeat steps 2 and 3.
4.	250MMF	"	1400KC	"	Tune for max. signal.	"	A7,A8	Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.05MFD	High side to pin 8 (Grid) of 7F8 (V2). Low side to chassis.	8.25MC (Unmod.)	FM	Point of non-interference.	DC Probe to Point (A) Common to chassis.	A9,A10 A11, A12, A13, A14	Adjust for maximum deflection.
6.	.05MFD	"	"	"	"	DC Probe to Point (B) Common to chassis.	A15	"
7.	.05MFD	"	"	"	"	DC Probe to Point (C) Common to chassis.	A16	Adjust for zero reading. A positive and negative reading will be obtained on either side ot the correct setting. Repeat steps 6 and 7.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.05MFD	High side to pin 8 (Grid) of 7F8 (V2). Low side to chassis.	8.25MC (450KC Sweep)	FM	Point of non-interference.	Vert.Amp. to Point (A) Low side to chassis.	A9,A10 A11, A12, A13, A14	Adjust for maximum amplitude and symmetry as per Fig 1.
6.	.05MFD	"	"	"	"	Vert.Amp. to Point (C) Common to chassis.	A15, A16	Refer to Fig 2. Adjust A15 for maximum amplitude and straightness of cross over lines. Adjust A16 so crossover point occurs at center of the pattern. Repeat the adjustment of A15 and A16 to assure accurate alignment of the discriminator transformer. Continue with step 8.

FIG. 1

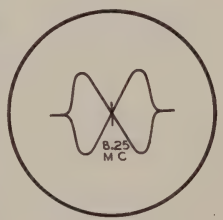
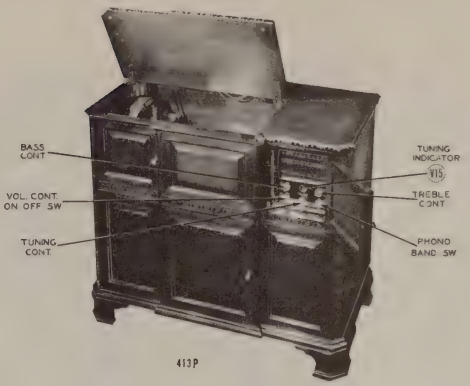


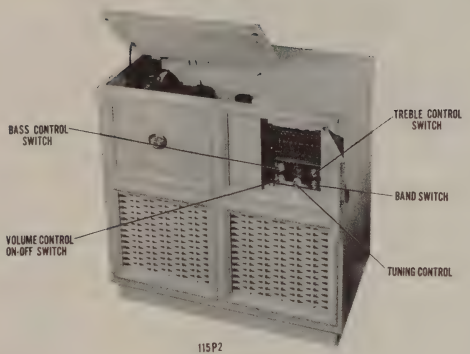
FIG. 2

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	Two 120Ω carbon res.	Across FM ant. terminals with 120Ω in each generator lead.	108MC	FM	108MC	DC Probe to Point (A) Common to chassis.	A17	Adjust for maximum deflection.
9.	"	"	90MC	"	90MC	"	L9	Expand or compress slightly the Osc. coil turns for maximum deflection. Repeat steps 8 and 9 until no further improvement can be made.
10.	"	"	108MC	"	108MC	"	A18	Adjust for maximum deflection.
11.	"	"	90MC	"	90MC	"	L5	Expand or compress slightly, the coil turns of the RF coil for max. deflection. Repeats steps 10 and 11 until no further improvement can be made.
12.	"	"	108MC	"	108MC	"	A19	Adjust for maximum deflection.

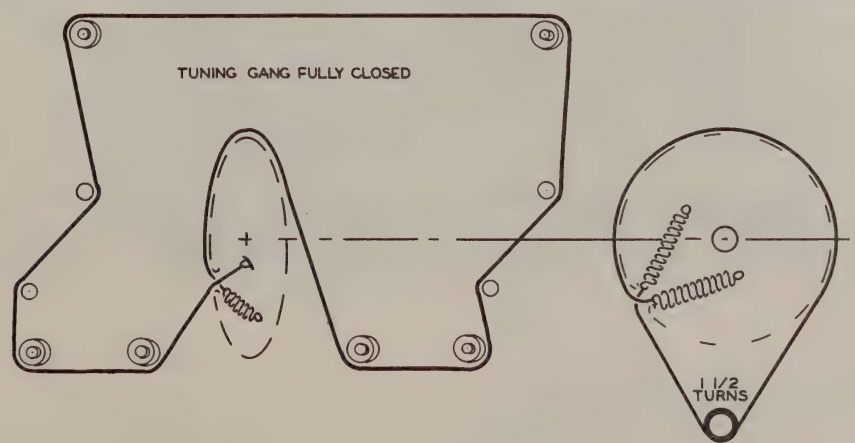


413P



115P2

TRADE NAME	Capehart, Models 115P2, 413P, 414P
MANUFACTURER	Farnsworth Television and Radio Corp., Fort Wayne, Indiana
TYPE SET	AC Operated Combination Phono-Radio, 2 Band AM-FM Superheterodyne Receiver with Loop Antenna
TUBES(TWENTY-EIGHT)	Models 413P, 414P (TWENTY-FIVE) Model 115P2 Types 6AG5 FM RF Amp., 6SK7 AM RF Amp., 6AG5 FM Mixer, 6SA7 AM Mixer, 6C4 FM Osc., 6J5 AM Osc., 6SK7 FM 1st IF, 6SK7 FM 2nd IF, 6SK7 AM 2nd IF, 6SK7 FM 3rd IF, 6H6 Ratio Det., 6SK7 AM DET-AVC, Phono AF, 6SN7 Tuning Ind. Amp., 6AF6 Tuning Ind., 6J7 Phono Pre.-Amp., 6SN7 1st AF Amp., 6J5 2nd AF Amp., 6J5 Phase Inv., (2) 6J5 Driver (4) 2A5 Power Output, (Models 413P, 414P), (2) 6L6G Power Output (Model 115P2), 5Y3GT Bias Rectifier, (Models 403P, 414P) (2) 5U4G) Rectifier.
POWER SUPPLY	105-125 Volts AC — RATING: 2.16 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC SHORT WAVE 9.4-15.4MC — FREQ. MOD. 88-108MC

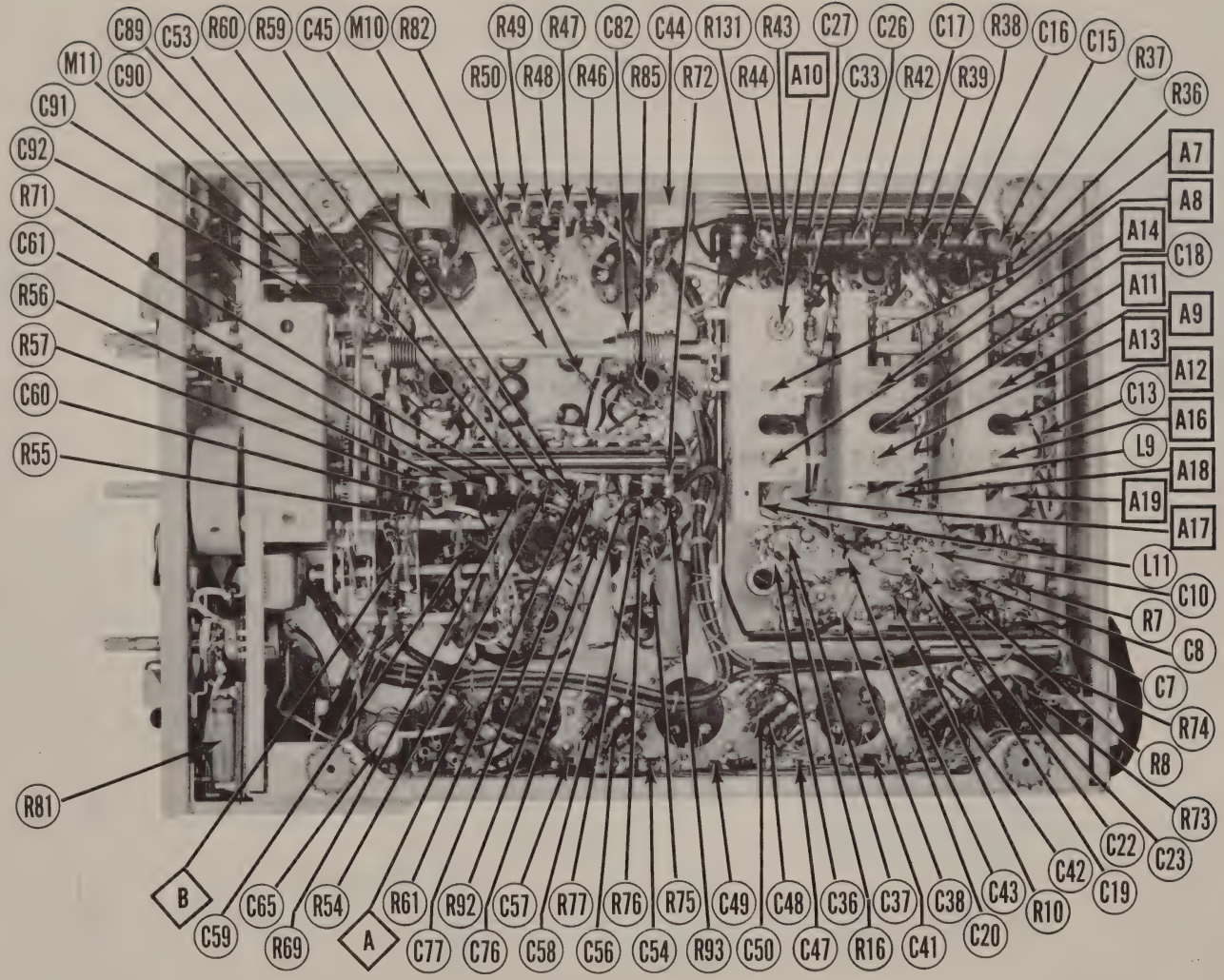


DIAL CORD DRIVE

CAPEHART MODELS
115P2, 413P, 414P

CAPEHART MODELS
115P2, 413P, 414P

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


C89
C53
R60
R59
C45
M10
R82
R49
R47
C82
C44
R131
R43
C27
C26
C17
R38
C16
C15
R37
R36
M11
C90
R50
R48
R46
R85
R72
R44
A10
C33
R42
R39
A7
A8
C91
C92
R71
C61
R56
R57
C60
R55
A14
C18
A11
A9
A13
A12
C13
A16
L9
A18
A19
A17
L11
C10
R7
C8
C7
R74
R8
R73
C22
C23
C42
C19
R10
C43
C38
C37
C36
C48
C49
R75
R76
R77
C57
R92
R61
C65
R54
R69
C59
B
A
C77
C76
C58
C56
C54
R93
C50
C47
R16
C41
C20
R81

L8
C14
L4
L10
L6
C24
C31
L7
L14
R41
C35
C21
C11
C9
L22
R9
L23
R11
L24
R14
R12
C39
C40
R17
R19
R18
C13
R20
L25
R21
R15
R22
C46
R24
R23
R25
L26
R26
R77
C55
R28
C51
R29
L27
R30
C64
L28
R33
R32
C63
R79
R62
C62
R31
C85
C84
C86
C87
C81
C6
C66
C83
C80
R1
R80
C78
R63
R78
C67
R51
R58
R52
R53
R66
R70
R65
R64
R67
R68
R86
R84
R83
C75
C12
C34
R45
C30
C28
R40
C29
C25
R34
C32

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	FM RF Amp.	6AG5	6AG5	7BD	
V2	AM RF Amp.	6SK7	6SK7	8N	
V3	FM Mixer	6AG5	6AG5	7BD	
V4	AM Mixer	6SA7	6SA7	8R	
V5	FM Osc.	6C4	6C4	6BG	
V6	AM Osc.	6J5	6J5	6Q	
V7	FM 1st IF	6SK7	6SK7	8N	
V8	AM 1st IF	6SK7	6SK7	8N	
V9	FM 2nd IF	6SK7	6SK7	8N	
V10	AM 2nd IF	6SK7	6SK7	8N	
V11	FM 3rd IF	6SK7	6SK7	8N	
V12	Ratio Det.	6H6	6H6	7Q	
V13	AM DET-AVC, Phono AF	6SR7	6SR7	8Q	
V14	Tuning Ind. Amp	6SN7GT	6SN7GT	8BD	
V15	Tuning Indicator	6AF6	6AF6	7AG	
V16	Phono Pre Amp	6J7	6J7	7R	
V17	1st AF Amp.	6SN7GT	6SN7GT	8BD	
V18	2nd AF Amp.	6J5	6J5	6Q	
V19	Phase Inverter	6J5	6J5	6Q	
V20	Driver	6J5	6J5	6Q	
V21	Driver	6J5	6J5	6Q	
V22	Power Output	2A3	2A3	4D	
V23	Power Output	2A3	2A3	4D	
V24	Power Output	2A3	2A3	4D	
V25	Power Output	2A3	2A3	4D	
V26	Bias Rectifier	5Y3GT	5Y3GT	5T	
V27	Rectifier	5U4G	5U4G	5T	
V28	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	*25297	AF4444J*	UP2222		DY-4x20	EL-420*	Filter
B	40	450			45*		-450*		Filter
C2	80	450	*25297	AF4444J*	UP2222		DY-4x20	EL-420*	
					45*		-450*		Filter
C3A	20	250	25315	AF43F4A§	UP		DY-2x20	EL-354	
					22135		-350		Bias Filter
B	20	250		PRS250/20			M-16-250		Bias Filter
C	20	250							Bias Filter
C4A	10	450	25050	AF22J4A	UP		DY-2x10	EL-202	
					1145C		-450		Decoupling
B	10	450					M-25-25		Decoupling
C	20	25							1st AF Cath. Bypass
C5	50	25	25313	PRS25/50	AVL			TVA-7	
					10240				Bias Filter
C6	4	100	25270	PRS150/4	BR415		M-4-450	UT-41	Stabilizing Cap
C7	500		25293	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	FM RF Cath. Bypass
C8	500		25293	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	FM RF Screen Bypass
C9	500		25293	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	FM RF Decoupling
C10	50		25290	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Coupling
C11	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-216	1FM-215	FM RF Fil. Bypass
C12	250	500	25069	1469-00025	5R5T25		MOS.5		
							-325		Fixed Padder
C13	50		25290	1469-00005	5R5Q5	NPOM-50	MOS.5-45	MS-45	Fixed Trimmer
C14	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C15	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	AM RF Cath. Bypass
C16	5000	300	25298	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AM RF Screen Bypass
C17	5000	300	25298	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AM RF Plate Decoup.
C18	.05	200	25305	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C19	50		25290	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Coupling
C20	2		25289			NP0K-3			Osc. Coupling
C21	500		25293	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	Mixer Screen Bypass
C22	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Mixer Fil. Bypass
C23	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Mixer Plate Decoup.

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C91	3000	300	25051	1467-003	1W5D3	GP2M-003	MW.5-23	1FM-23	Tone Compensation
C92	5000	300	25298	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Tone Compensation
C93	.05	600	25134	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C94	100	500	Note 4	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Tone Compensation
C95	100	500	Note 4	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Tone Compensation
C96	200	500	Note 4	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Tone Compensation
C97	.05	600	25134	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C98	.05	600	25134	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C99	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	Fil.Byp. Note 3
C100	.01	600	25209	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Line Filter
C101	.01	600	25209	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Line Filter

§Omit Bypass Section.
*Parallel Sections To Obtain Desired Capacity.
Note 1. Some Models Use 30MMF In This Application.
Note 2. When Either Item C62 Or C63 Are Replaced, Replace Both With Capacitors Of Equal Value.
Note 3. Not Used In All Models.
Note 4. Items C94, C95, C96, R127, R128, R129, And R130 Are Combined Into One Unit, Obtainable Under Mfgr's Part No. 11468.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	78147			Volume control tapped @ 250KΩ
B	1 Meg.	½				Volume control
R2	10KΩ	½	78111	Q11-116	M-27-S	Tuning eye balance
R3	5000Ω	1	78116	W-5000	43-5000	Bias control
R4	5000Ω	1	78116	W-5000	43-5000	Bias control
R5	20KΩ	½	78122	Q11-120	M-40-S	Pre-set volume control
R6	20Ω	1	78117	W-20	43-20	Hum balance control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R7	220Ω	½	77209		FM RF Cathode
R8	4700Ω	½	77211	BTS-4700	FM RF Plate Load
R9	100KΩ	½	77214	BTS-100K	FM RF Screen
R10	1 Meg.	½	77218	BTS-1 Meg.	FM Mixer Grid
R11	220KΩ	½	77216	BTS-220K	FM Mixer Screen
R12	1000Ω	½	77262	BTS-1000	FM Mixer Plate Decoupling
R13	470Ω	1	77333	BTA-470	Decoupling
R14	22KΩ	1	77069	BTA-22K	FM Osc. Plate
R15	22KΩ	1	77069	BTA-22K	FM Osc. Plate
R16	33KΩ	½	77267	BTS-33K	FM Osc. Grid
R17	100KΩ	½	77214	BTS-100K	AVC Network
R18	68Ω	½	77269		1st FM IF Cathode
R19	220Ω	½	77209		1st FM IF Cathode
R20	68KΩ	½	77305	BTS-68K	1st FM IF Screen
R21	1000Ω	½	77262	BTS-1000	1st FM IF Plate Decoupling
R22	100KΩ	½	77214	BTS-100K	AVC Network
R23	68Ω	½	77269		2nd FM IF Cathode
R24	220Ω	½	77262		2nd FM IF Cathode
R25	68KΩ	½	77305	BTS-68K	2nd FM IF Screen
R26	1000Ω	½	77262	BTS-1000	2nd FM IF Plate Decoupling
R27	100KΩ	½	77214	BTS-100K	3rd FM IF Grid
R28	220Ω	½	77209		3rd FM IF Cathode
R29	68KΩ	½	77305	BTS-68K	3rd FM IF Screen
R30	1000Ω	½	77262	BTS-1000	3rd FM IF Decoupling
R31	33KΩ	½	77267	BTS-33K	Disc. Load
R32	33KΩ	½	77267	BTS-33K	Disc. Load
R33	2.2 Meg.	½	77270	BTS-2.2 Meg.	AVC Network
R34	100KΩ	½	77214	BTS-100K	AVC Network
R35	510Ω	½	77353		Parasitic Suppressor
R36	33Ω	½	77257	BW-½-33	AM RF Cathode
R37	330Ω	½	77260	BW-½-330	AM RF Cathode

PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA CAPEHART PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C24	20		25303		5R5Q2	NPOK-20	MOS.5-42	MS-42	Fixed Trimmer
C25	250	500	25069	1468-00025	5W5T25	GP2K-250	MO.5-325		Fixed Padder
C26	5000	300	25298	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Mixer Cath. Bypass
C27	5000	300	25298	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Mixer Screen Bypass
C28	350	500	25331	1468-00035					Fixed Trimmer
C29	20		25303		5R5Q2	NPOK-20	MOS.5-42	MS-42	Fixed Trimmer
C30	20		25303		5R5Q2	NPOK-20	MOS.5-42	MS-42	Fixed Trimmer
C31	5000	300	25298	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Tuning Cap Isolation
C32	250	500	25069	1469-00025	5R5T25		MOS.5 -325		Fixed Padder
C33	500	500	25307	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	Osc. Feedback
C34	50		25290	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap
C35	500		25293	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	Osc. Feedback
C36	50		25375	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap
C37	10		25329	1469-00001	5R5Q1	NPOK-10	MOS.5-41	MS-41	Fixed Trimmer Note 1
C38	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM Osc. Fil. Bypass
C39	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	AVC Filter
C40	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 1st IF Cath. Byp.
C41	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 1st IF Decoupling
C42	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 1st IF Screen Byp.
C43	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 1st IF Fil. Byp.
C44A	.1	600	25287	630T-3x.1	DYRT6111		XDMR6 -3x.1	TM-1	Decoupling
B	.1	600						TM-1	Mixer Plate Decoup.
C	.1	600						TM-1	AVC Filter
C45A	.1	600	25287	630T-3x.1	DYRT6111		XDMR6 -3x.1	TM-1	AM 1st IF Screen Byp.
B	.1	600						TM-1	AM 1st IF Cath. Byp.
C	.1	600						TM-1	AM 1st IF Plate Decoup.
C46	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 2nd IF Cath. Byp.
C47	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	AVC Filter
C48	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 2nd IF Screen Byp.
C49	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 2nd IF Decoup.
C50	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 2nd IF Fil. Byp.
C51	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Decoupling
C52A	.1	600	25286	630MB-3x.1	DYRB6111			BP-316	AM 2nd IF Cath. Byp.
B	.1	600							AM 2nd IF Screen Byp.
C	.1	600							AM 2nd IF Plate Dec.
C53	100	500	25188	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	IF Coupling
C54	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 3rd IF Grid Filter
C55	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 3rd IF Cath. Byp.
C56	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 3rd IF Screen Byp.
C57	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 3rd IF Decoupling
C58	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM 3rd IF Fil. Bypass
C59	100	500	25145	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C60	100	500	25145	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C61	.01	400	25305	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Tone Compensation
C62	80		25406	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Load Cap Note 2
C63	80		25406	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Load Cap Note 2
C64	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C65	1000	500	25053	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	De-emphasis
C66	1500		25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	FM Ratio Det. Fil. Byp.
C67	.1	200	25182	P288-1	GT2P1		ST-2-1	TM-1	Ind.Amp Grid Fil.
C68	.005	200	25306	P688-05	GT6D5	GP2M-005	ST-6-005	TM-25	Tone Compensation
C69	.02	200	25304	P488-02	GT2S2		ST-4-02	TM-12	Tone Compensation
C70	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	Tone Compensation
C71	.1	200	25182	P288-1	GT2P1		ST-2-1	TM-1	Audio Coupling
C72	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	Tone Compensation
C73	.1	200	25182	P288-1	GT2P1		ST-2-1	TM-1	Tone Compensation
C74	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	Tone Compensation
C75	.1	400	25182	P488-1	GT4P1		ST-4-1	TM-1	Pre.Amp.Screen Byp.
C76	270	500	25190	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	Tone Compensation
C77	5000	300	25141	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Audio Coupling
C78	.1	600	25309	630B-.1	DYR6010		XDMR6-.1	TM-1	Audio Coupling
C79	50		25290	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Tone Comp. Note 3
C80	20			1468-000025	5W5Q2	GP1K-25	MO.5-425	MS-42	Tone Comp. Note 3
C81	5000	300	25306	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Tone Compensation
C82	470	500		1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	1st AF Plate Bypass
C83	.5	100	25118	P288-5	GT2P5		ST-2-5	TC-5	Tone Compensation
C84	.02	100	25304	P488-02	GT2S2		ST-4-02	TM-12	Tone Compensation
C85	.005	100	25306	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Tone Compensation
C86	.01	100	25305	P488-01	GT2S1	GP2-335-01	ST-4-01	TM-11	Tone Compensation
C87	.02	100	25304	P488-02	GT2S2		ST-4-02	TM-12	Tone Compensation
C88	.02	100	25304	P488-02	GT2S2		ST-4-02	TM-12	Tone Compensation
C89	2000	300	25295	1467-002	1W5D2	GP2M-002	MW.5-22	1FM-22	Tone Compensation
C90	2000	300	25295	1467-002	1W5D2	GP2M-002	MW.5-22	1FM-22	Tone Compensation

DATE 8/49 4915-6 SET #67 FOLDER #6

PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	IDENTIFICATION CODES
R38	68KΩ	½	77305	BTS-68K	AM RF Screen
R39	1000Ω	½	77262	BTS-1000	AM RF Plate Decoupling
R40	100KΩ	½	77214	BTS-100K	AVC Network
R41	47Ω	½	77208		Parasitic Suppressor
R42	220Ω	½	77209	BW-½-220	AM Mixer Cathode
R43	22KΩ	1	77069	BTA-22K	AM Mixer Screen
R44	22KΩ	½	77266	BTS-22K	Osc. Grid
R45	10KΩ	½	77212	BTS-10K	Equalizing
R46	1000Ω	½	77262	BTS-1000	AM Mixer Plate Decoupling
R47	33Ω	½	77257	BW-½-33	1st AM IF Cathode
R48	220Ω	½	77209	BW-½-220	1st AM IF Cathode
R49	68KΩ	½	77305	BTS-68K	1st AM IF Screen
R50	1000Ω	½	77262	BTS-1000	1st AM IF Plate Decoupling
R51	220Ω	½	77209	BW-½-220	2nd AM IF Cathode
R52	68KΩ	½	77305	BTS-68K	2nd AM IF Screen
R53	1000Ω	½	77262	BTS-1000	2nd AM IF Plate Decoupling
R54	2.2 Meg.	½	77270	BTS-2.2 Meg.	AVC Network
R55	100KΩ	½	77214	BTS-100K	Diode RF Filter
R56	100KΩ	½	77214	BTS-100K	Diode Load
R57	220KΩ	½	77216	BTS-220K	Tone Compensation
R58	100KΩ	½	77214	BTS-100K	Tone Compensation
R59	680KΩ	½	77335	BTS-680K	AVC Network
R60	330KΩ	½	77268	BTS-330K	AVC Network
R61	2.2 Meg.	½	77270	BTS-2.2 Meg.	Tuning Eye Amp. Filter
R62	2.2 Meg.	½	77270	BTS-2.2 Meg.	Tuning Eye Amp. Filter
R63	15KΩ	½	77265	BTS-15K	Tuning Eye Amp. Cathode
R64	470KΩ	½	77217	BTS-470K	Tuning Eye Amp. Plate
R65	330KΩ	½	77268	BTS-330K	Tuning Eye Amp. Plate
R66	68KΩ	½	77305	BTS-68K	Tuning Eye Plate
R67	2.2 Meg.	½	77270	BTS-2.2 Meg.	Voltage Divider Network
R68	470KΩ	½	77217	BTS-470K	Voltage Divider Network
R69	1 Meg.	½	77218	BTS-1 Meg.	2nd Pre Amp. Grid
R70	100KΩ	½	77214	BTS-100K	Bias Network
R71	100KΩ	½	77214	BTS-100K	2nd Pre Amp. Plate
R72	15KΩ	½	77265	BTS-15K	Filter
R73	3.3 Meg.	½	77207	BTS-3.3 Meg.	Bias Network
R74	1 Meg.	½	77218	BTS-1 Meg.	Pre Amp. Grid
R75	2.2 Meg.	½	77270	BTS-2.2 Meg.	Pre Amp. Screen
R76	470KΩ	½	77217	BTS-470K	Pre Amp. Plate
R77	100KΩ	½	77214	BTS-100K	Tone Compensation
R78	220KΩ	½	77216	BTS-220K	Voltage Divider
R79	47KΩ	½	77213	BTS-47K	De-emphasis
R80	470KΩ	½	77262	BTS-470K	Voltage Divider
R81	22KΩ	½	77266	BTS-22K	Tone Compensation
R82	1500Ω	½	77263	BTS-1500-5%	AF Cathode 5%
R83	100KΩ	½	77214	BTS-100K	AF Plate
R84	56KΩ	½	77324	BTS-56K	Filter
R85	22KΩ	½	77266	BTS-22K	AF Coupling
R86	10KΩ	½	77213	BTS-10K	Cathode Follower
R87	10 Meg.	½	77274	BTS-10 Meg.	Tone Compensation
R88	10 Meg.	½	77274	BTS-10 Meg.	Tone Compensation
R89	10 Meg.	½	77274	BTS-10 Meg.	Tone Compensation
R90	10 Meg.	½	77274	BTS-10 Meg.	Tone Compensation
R91	10 Meg.	½	77274	BTS-10 Meg.	Tone Compensation
R92	33Ω	½	77257	BW-½-33	Fil. String
R93	33Ω	½	77257	BW-½-33	Fil. String
R94	6.8Ω	½	77095	BW-½-6.8	Series Pilot Light
R95	6.8Ω	½	77095	BW-½-6.8	Series Pilot Light
R96	10KΩ	½	77212	BTS-10K	Tone Compensation
R97	4700Ω	½	77211	BTS-4700	Tone Compensation
R98	3300Ω	½	77195	BTS-3300	Tone Compensation
R99	160KΩ	½	77453		Tone Compensation 5%
R100	160KΩ	½	77453		Tone Compensation 5%
R101	160KΩ	½	77453		Tone Compensation 5%
R102	160KΩ	½	77453		Tone Compensation 5%
R103	22KΩ	½	77214	BTS-22K	AF Grid
R104	2200Ω	½	77262	BTS-2200	AF Cathode
R105	56KΩ	½	77353	BTS-56K-5%	AF Plate 5%
R106	22KΩ	½	77214	BTS-22K	Voltage Divider
R107	220KΩ	½	77333	BTS-220K	Voltage Divider
R108	470KΩ	½	77218	BTS-470K	Inverter Grid
R109	56KΩ	½	77353	BTS-56K-5%	Inverter Cathode 5%
R110	56KΩ	½	77353	BTS-56K-5%	Inverter Plate 5%
R111	470KΩ	½	77218	BTS-470K	Driver Grid
R112	470KΩ	½	77218	BTS-470K	Driver Grid
R113	1500Ω	½	77209	BTS-1500	Driver Cathode

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	CAPEHART PART No.	IRC PART No.	
R114	150Ω	½	77209	BTS-1500	Driver Cathode
R115	47KΩ	½	77216	BTS-47K	Output Grid
R116	47KΩ	½	77216	BTS-47K	Output Grid
R117	510Ω	½	77260		Output Grid
R118	510Ω	½	77260		Output Grid
R119	22KΩ	½	77214	BTS-22K	Bias Network
R120	22KΩ	½	77214	BTS-22K	Bias Network
R121	22KΩ	½	77214	BTS-22K	Bias Network
R122	680Ω	½	77351	BW-½-680	Bias Network
R123	47KΩ	½	77257	BTS-47K	Filter
R124	3300Ω	½	77269	BTS-3300	Bias Filter
R125	3300Ω	½	77269	BTS-3300	Bias Filter
R126	33Ω	½	77305	BW-½-33	Isolation
R127	160KΩ	½	See Note		Tone Compensation 5%
R128	160KΩ	½	See Note		Tone Compensation 5%
R129	160KΩ	½	See Note		Tone Compensation 5%
R130	160KΩ	½	See Note		Tone Compensation 5%
R131	22KΩ	1	77069	BTA-22K	AM Osc. Plate Load

Note: Items C94, C95, C96, R127, R128, R129 And R130 Are Combined Into One Unit, And Are Obtainable Under Mfgr's Part No. 11468.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ 1.94A	900VAC CT .25 A DC	5.0VAC @ 6.0A	6.6VAC @ 1.3A	94124			
		SEC. 4	SEC. 5	SEC. 6				
		2.5VAC @ 10A	6.6VAC @ 5.2A	6.0VAC @ .9A				

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T2	117VAC @ .22A	175VAC CT .006 A DC	5VAC @ 2A		94203			

TRANSFORMER (DRIVER)

ITEM No.	RATING			REPLACEMENT DATA				INSTALLATION NOTES
	TURNS RATIO PRI. TO ½ SEC	DC RES. PRI.	DC RES. SEC.	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
T3	2 To 1	2900Ω CT	1500Ω Per ½ Sec.	94202				

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE PRI.	IMPEDANCE SEC.	DC RES. PRI.	DC RES. SEC.	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
T4	1400Ω CT	4Ω	56Ω CT	.3Ω	94157				

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V.C. IMP.	CAPEHART PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	4Ω	81166			
	CONE DIA.	V.C. DIA.				
SP2	11-5/8"	4"				

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
L1	.250A	90Ω	6H	94161	C-1412*	TR-4225*	C-3196*	*Drill New
L2	.093A	90Ω	6H	94161	C-1412*	TR-4225*	C-3196*	Mtg. Holes

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	CAPEHART PART No.	MEISSNER PART No.
L3	AM Loop Ant	0Ω			
L4	Loop Loading Coil	2Ω		38705	
L5	FM Dipole Ant.	0Ω			
L6	AM Ant.Coil	60Ω	6Ω	09308	
L7	SW Ant.Coil	.3Ω	0Ω	09309	
L8	AM RF Coil	0Ω	0Ω	09306	
L9	SW RF Coil	.6Ω	0Ω	09307	
L10	AM Osc.Coil	1Ω	1Ω	09304	
L11	SW Osc.Coil	.1Ω	.1Ω	09305	
L12	FM Ant.Coil	0Ω			
L13	FM RF Coil	0Ω			
L14	FM Osc.Coil	0Ω		38752	
L15	AM 1st IF	5Ω		38653	
L16	AM 2nd IF	5Ω		38653	
L17	AM 3rd IF	5Ω	5Ω	38654	
L18	FM 1st IF	.5Ω	.5Ω	38655	
L19	FM 2nd IF	.5Ω	.5Ω	38655	
L20	FM 3rd IF	.5Ω	.5Ω	38655	
L21	FM Disc. Trans.	1.5Ω	0Ω	38803	
L22	Fil. Choke	.1Ω		38661	
L23	Fil. Choke	.1Ω		38661	
L24	Fil. Choke	.1Ω		38661	
L25	Fil. Choke	.1Ω		38661	
L26	Fil. Choke	.1Ω		38661	
L27	Fil. Choke	.1Ω		38661	
L28	Fil. Choke	.1Ω		38661	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					CAPEHART PART No.		
M1 Thru M9	Bayonet	6-8V	0.25A	Blue			Type #44

MISCELLANEOUS

ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M10A	Switch	90206	Band (Antenna)
B		90203	Band (Osc., Conv., RF Grid)
C		90204	Band (Osc., RF Plate)
D		90208	Band (Tuning Eye)
E		90210	Band (B Plus)
F		90209	Band (Audio)
M11	Switch	90219	Phono-Radio
M12	Switch	90194	Reject
M13	Switch	90201	Antenna
M14	Switch	78114	Bass
M15	Switch	78114	Treble
M16	Relay	90215	Power Line
M17	Fuse	48015	½ Amp.
M18	Fuse	48006	5 Amp.
M19	Tuning Gang	26230	
M20	Filter Assembly	13826	Phono
	Trimmer	26231	A7, A8, A9, A13, A14, A15
	Padder	26111	A10
	Trimmer	25221	A28, A29, A30

M9
M6
M7
R94
V10
L16
A3
A4
C52
V8
C5
L15
A5
A6
V17
M20
V6
V4
L13
V2
L12
M19
A28
A31
A29
A30
A13
V1
V3
V5
L18
V7
A27
A26
L19
A25
A24
SP2
SP1
V9
V16
L20
A23
A22
C4
V11
V14
A21
A20
L21
R2
V12
R95
C88
M2
M1
M8
A2
A1
V13
L17
M3
M5
M4
R88
R89
R90
R91

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V29	2nd AF Amp.	6J5	6J5	6Q	
V30	Phase Inverter	6J5	6J5	6Q	
V31	Driver	6J5	6J5	6Q	
V32	Driver	6J5	6J5	6Q	
V33	Power Output	6L6G	6L6G	7AC	
V34	Power Output	6L6G	6L6G	7AC	
V35	Rectifier	5U4G	5U4G	5T	
V36	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C102	80	450	25297*	AF4444J*	UP 222245*		DY-2x20 -450*	EL-420*	Filter
C103A	40	450	25297*	AF4444J*	UP 222245*		DY-2x20 -450*	EL-420*	Filter
B	20	450							Filter
C	20	450							Filter
C104	50	25	25269	PR825/50	BR502		M-50-25	TA-50	Output Cath. Bypass
C105	50	25	25269	PR825/50	BR502		M-50-25	TA-50	Output Cath. Bypass
C106	.05	600	25314	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C107	100	500	Note 1	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Tone Compensation
C108	100	500	Note 1	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Tone Compensation
C109	200	500	Note 1	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Tone Compensation
C110	.05	600	25314	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C111	.05	600	25314	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C112	.05	200	25080	P288-05	GT2S5		ST-4-05	TM-15	Driver Fil. Bypass
C113	.01	600	25083	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C114	.01	600	25083	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C115	1	100							Audio Coupling
C116	.01	600	25209	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Line Filter
C117	.01	600	25209	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Line Filter

*Parallel Sections To Obtain Desired Capacity
Note 1. Items C109, C110, C111, R136, R137, R138 And R139 Are Combined Into One Unit Obtainable Under Mfgr's Part No. 11468.

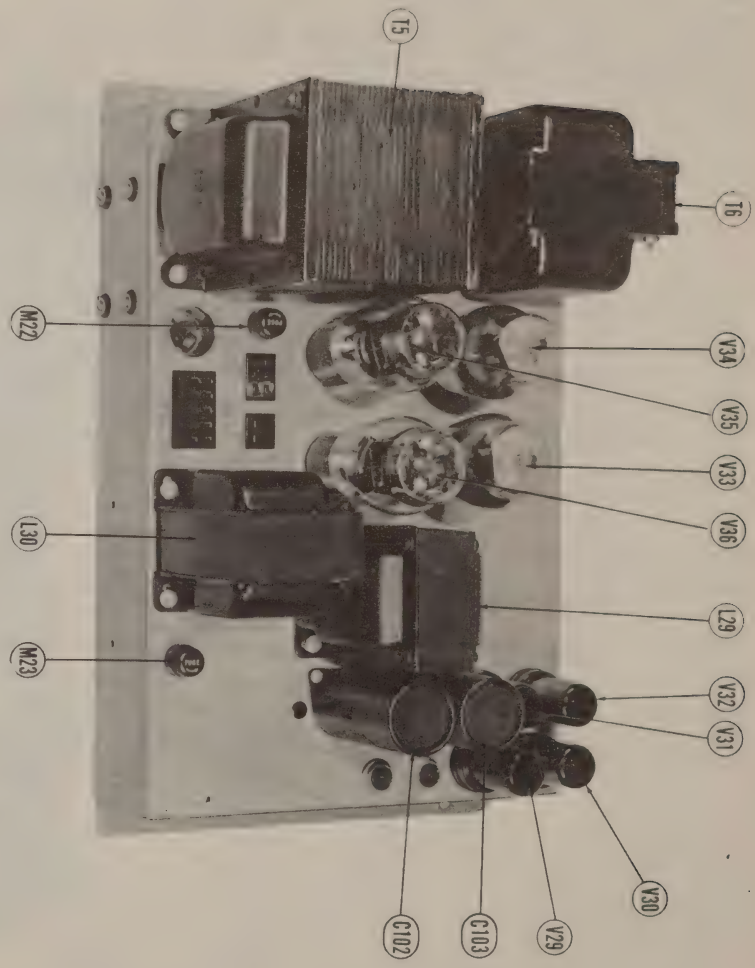
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R132	20KΩ	½	78122	Q11-120	M-40-S	Pre set volume control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CAPEHART PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R133	22KΩ	½	77266	BTS-22K	AF Amp. Grid
R134	2200Ω	½	77264	BTS-2200	AF Amp. Cathode
R135	56KΩ	½	77329	BTS-56K	AF Amp. Plate
R136	160KΩ	½	See Note		Tone Compensation 5%
R137	160KΩ	½	See Note		Tone Compensation 5%
R138	160KΩ	½	See Note		Tone Compensation 5%
R139	160KΩ	½	See Note		Tone Compensation 5%
R140	470KΩ	½	77217	BTS-470K	Phase Inverter Grid
R141	56KΩ	½	77329	BTS-56K	Phase Inverter Cathode
R142	56KΩ	½	77329	BTS-56K	Phase Inverter Plate
R143	330KΩ	½	77268	BTS-330K	Output Grid
R144	330KΩ	½	77268	BTS-330K	Output Grid
R145	3300Ω	½	77210	BTS-3300	Output Cathode
R146	3300Ω	½	77210	BTS-3300	Output Cathode
R147	56KΩ	½	77329	BTS-56K	Output Plate
R148	56KΩ	½	77329	BTS-56K	Output Plate
R149	22KΩ	½	77266	BTS-22K	Voltage Divider
R150	220KΩ	½	77216	BTS-220K	Voltage Divider

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	CAPEHART PART No.	IRC PART No.	
R151	330KΩ	½	77268	BTS-330K	Output Grid
R152	330KΩ	½	77268	BTS-330K	Output Grid
R153	220ΩΩ	½	77264	BTS-2200	Output Grid
R154	220ΩΩ	½	77264	BTS-2200	Output Grid
R155	250Ω	5	77334	AB-250	Output Cathode
R156	250Ω	5	77334	AB-250	Output Cathode
R157	33KΩ	½	77267	BTS-33K	Feedback
R158	33KΩ	½	77267	BTS-33K	Feedback
R159	33Ω	½	77257	BW-½-33	Bias Network
R160	33Ω	½	77257	BW-½-33	Bias Network
R161	22KΩ	½	77266	BTS-22K	Bias Network
R162	56KΩ	½	77329	BTS-56K	Filter
R163	1000Ω	½	77262	BTS-1000	Filter
R164	5500Ω	30	77350		Bleeder
R165	33Ω	½	77257	BW-½-33	Isolation
R166	30Ω	5		AB-30	Matching

Note. Items C109, C110, C111, R136, R139, R138, and R139 Are Combined Into One Unit And Are Obtainable Under Mfgr's Part No. 11468.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T5	117VAC	840VAC CT @ .27A DC	5VAC @ 6A	6.5VAC 5.3A	94125			
		SEC. 4	SEC. 5					
		6.6VAC @ 4.0A	6.6VAC @ 1.2A					

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T6	7000Ω CT	8Ω	260Ω CT	.5Ω	94158				

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ↺)	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
L29	.250A	90Ω	6H	94161	C-1412*	TR-4225*	C-3196*	*Drill New
L30	.084A	90Ω	6H	94161	C-1412*	TR-4225*	C-3196*	Mounting Holes

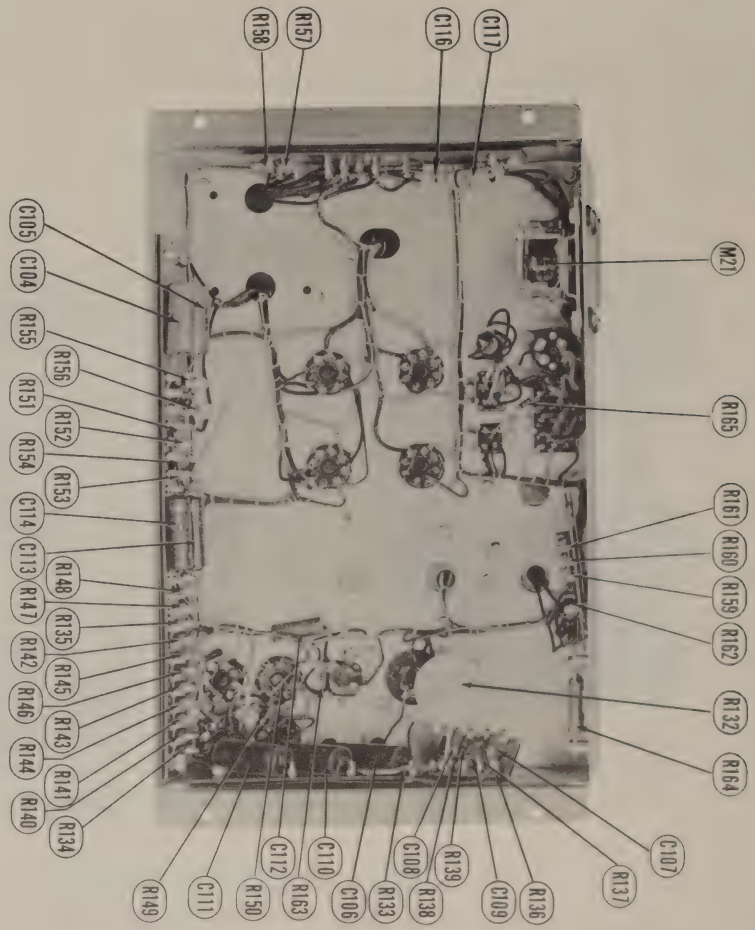
SPEAKER

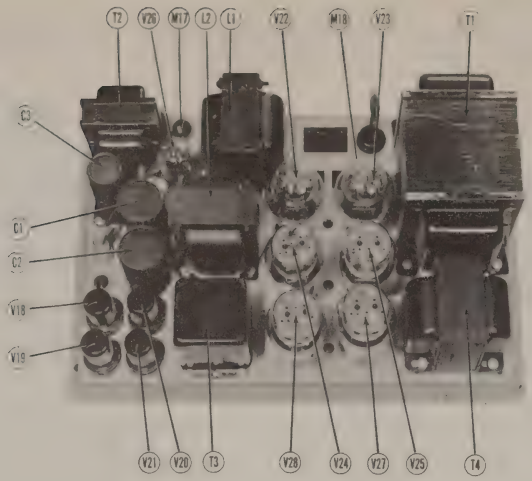
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V.C. IMP.	CAPEHART PART No.	JENSEN PART No.	QUAM PART No.	
SP3	PM	8Ω	81152	ST-654 MOD.P15-N ST-589 MOD.Q8-P		
SP4	PM	13Ω				
	CONE DIA.	V.C. DIA.				
SP5	14-1/4"	1-1/2"				
SP6	4-7/8"	9/16"				

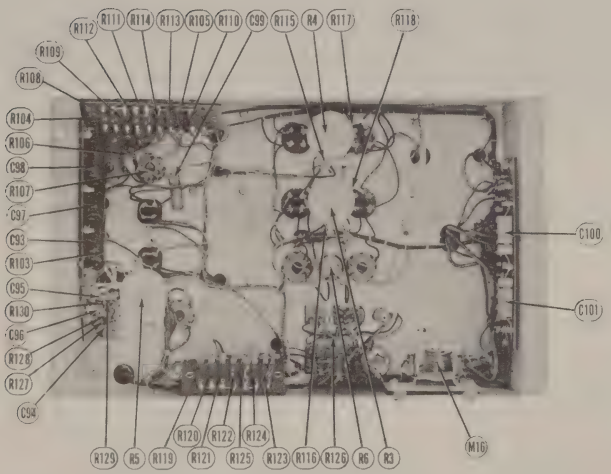
MISCELLANEOUS

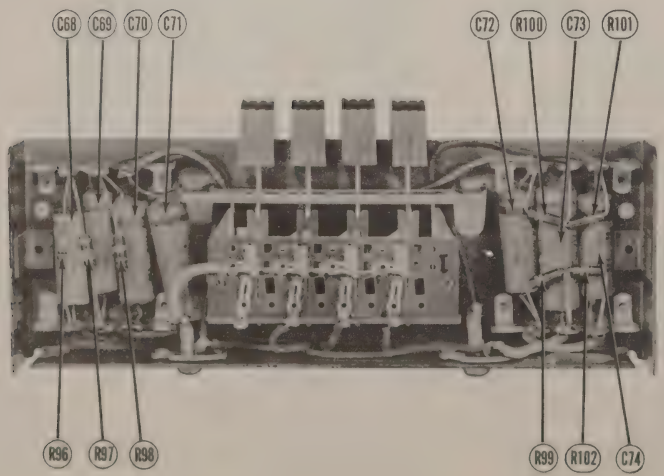
ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M21	Relay	90215	
M22	Fuse		3 Amp.
M23	Fuse	48015	½ Amp.

CHASSIS—BOTTOM VIEW




T2
V26
M17
L2
L1
V22
M18
V23
T1
C3
C1
C2
V18
V19
V21
V20
T3
V28
V24
V27
V25
T4


R112
R111
R114
R113
R105
R110
C99
R115
R4
R117
R118
R109
R108
R104
R106
C98
R107
C97
C93
R103
C95
R130
C96
R128
R127
C94
C100
C101
M16
R129
R5
R119
R120
R121
R122
R125
R124
R123
R116
R126
R6
R3


C68
C69
C70
C71
C72
R100
C73
R101
R96
R97
R98
R99
R102
C74

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡	V 1	6AG5	0V	2.2VDC	0V	6.1VAC	280VDC	135VDC	2.2VDC		
	V 2	6SK7	0V	0V	0V	-.1VDC	4VDC	120VDC	6.2VAC	300VDC	
‡	V 3	6AG5	-5.3VDC	0V	0V	6.1VAC	300VDC	145VDC	0V		
	V 4	6SA7	0V	6.2VAC	300VDC	110VDC	-10VDC	2VDC	0V	0V	
‡	V 5	6C4	175VDC	0V	6.2VAC	0V	175VDC	§-9VDC	0V		
	V 6	6J5	0V	0V	125VDC	0V	§-19VDC	0V	6.2VAC	0V	
‡	V 7	6SK7	0V	0V	0V	0V	3.6VDC	120VDC	6.2VAC	310VDC	
	V 8	6SK7	0V	6.2VAC	0V	0V	3.5VDC	125VDC	0V	310VDC	
‡	V 9	6SK7	0V	0V	0V	0V	3.8VDC	130VDC	6.2VAC	310VDC	
	V 10	6SK7	0V	0V	0V	0V	3.6VDC	125VDC	6.2VAC	310VDC	
‡	V 11	6SK7	0V	0V	0V	0V	2.5VDC	100VDC	6.2VAC	310VDC	
‡	V 12	6H6	0V	0V	-.3VDC	-.1VDC	.1VDC	0V	6.2VAC	1.2VDC	
	V 13	6SR7	0V	-.5VDC	0V	-.2VDC	-.3VDC	70VDC	3.2VAC	3.2VAC	
	V 14	6SN7	-.4VDC	25VDC	0V	-.4VDC	21VDC	0V	6.2VAC	0V	
	V 15	6AF6	0V	0V	21VDC	25VDC	240VDC	0V	6.2VAC	0V	
♦	V 16	6J7	0V	0V	31VDC	19VDC	0V	220VDC	3.2VAC	0V	TOP CAP -.4VDC
	V 17	6SN7	70VDC	310VDC	80VDC	0V	70VDC	2.5VDC	3.2VAC	3.2VAC	
	V 18	6J5	0V	24VAC	165VDC	0V	0V	0V	24VAC	6.3VDC	
	V 19	6J5	0V	24VAC	300VDC	0V	0V	0V	24VAC	16VDC	
	V 20	6J5	0V	24VAC	320VDC	320VDC	0V	0V	24VAC	0V	
	V 21	6J5	0V	24VAC	300VDC	0V	0V	0V	24VAC	8VDC	
	V 22	2A3	1.4VAC	330VDC	-70VDC	1.4VAC					
	V 23	2A3	1.4VAC	330VDC	-70VDC	1.4VAC					
	V 24	2A3	1.4VAC	330VDC	-70VDC	1.4VAC					
	V 25	2A3	1.4VAC	330VDC	-70VDC	1.4VAC					
	V 26	5Y3GT	0V	35VDC	0V	100VAC	0V	100VAC	0V	35VDC	
	V 27	5U4GT	0V	360VDC	0V	440VAC	0V	440VAC	0V	360VDC	
	V 28	5U4GT	0V	360VDC	0V	440VAC	0V	440VAC	0V	360VDC	

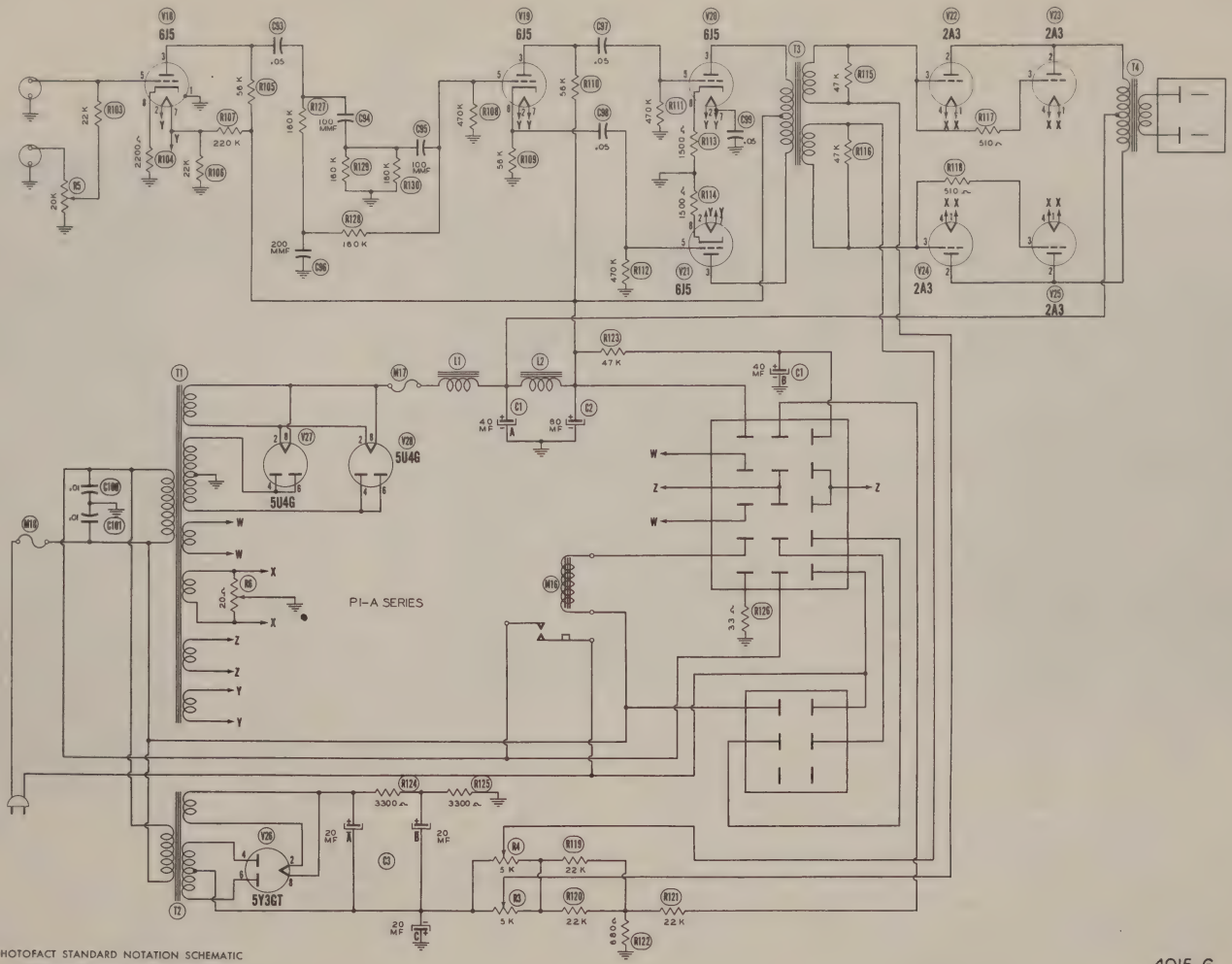
‡ Taken in FM position.
§ Taken with vacuum tube voltmeter.
♦ Radio-Phono switch in phono position.

RESISTANCE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡	V 1	6AG5	0Ω	220Ω	0Ω	.4Ω	*5.5KΩ	*100KΩ	220Ω		
	V 2	6SK7	0Ω	0Ω	0Ω	0Ω	340Ω	*75KΩ	.4Ω	2KΩ	
‡	V 3	6AG5	1 Meg.	0Ω	0Ω	.4Ω	*2KΩ	*220KΩ	0Ω		
	V 4	6SA7	0Ω	.4Ω	*1KΩ	*25KΩ	22KΩ	220Ω	0Ω	85KΩ	
‡	V 5	6C4	*13KΩ	Inf.	.4Ω	0Ω	*13KΩ	33KΩ	0Ω		
	V 6	6J5	0Ω	0Ω	*25KΩ	Inf.	20KΩ	Inf.	.4Ω	0Ω	
‡	V 7	6SK7	0Ω	0Ω	0Ω	2.4 Meg.	290Ω	*75KΩ	.4Ω	*1.5KΩ	
	V 8	6SK7	0Ω	.4Ω	0Ω	1.2 Meg.	230Ω	*65KΩ	0Ω	*1.5KΩ	
‡	V 9	6SK7	0Ω	0Ω	0Ω	2.4 Meg.	290Ω	*70KΩ	.4Ω	*1.5KΩ	
	V 10	6SK7	0Ω	0Ω	0Ω	1.3 Meg.	140Ω	*65KΩ	.4Ω	*1.2KΩ	
‡	V 11	6SK7	0Ω	0Ω	0Ω	100KΩ	220Ω	*855KΩ	.4Ω	*1.5KΩ	
‡	V 12	6H6	0Ω	0Ω	35KΩ	700KΩ	700KΩ	Inf.	.4Ω	33KΩ	
	V 13	6SR7	0Ω	1.3 Meg.	0Ω	200KΩ	700KΩ	*150KΩ	17Ω	17Ω	
	V 14	6SN7	2.4 Meg.	*350KΩ	0Ω	2.4 Meg.	*450KΩ	0Ω	.4Ω	0Ω	
	V 15	6AF6	Inf.	Inf.	400KΩ	400KΩ	*68KΩ	Inf.	Inf.	0Ω	
♦	V 16	6J7	0Ω	17Ω	*550KΩ	*2.2 Meg	0Ω	70KΩ	17Ω	0Ω	TOP CAP 1 Meg.
	V 17	6SN7	220KΩ	*180Ω	10KΩ	1 Meg.	*160KΩ	1.5KΩ	17Ω	17Ω	
	V 18	6J5	0Ω	20KΩ	*58KΩ	Inf.	30KΩ	Inf.	20KΩ	2KΩ	
	V 19	6J5	0Ω	20KΩ	*58KΩ	Inf.	470KΩ	Inf.	20KΩ	60KΩ	
	V 20	6J5	0Ω	20KΩ	*1.5KΩ	50KΩ	470KΩ	Inf.	22KΩ	1.5KΩ	
	V 21	6J5	0Ω	22KΩ	*1.5KΩ	Inf.	470KΩ	Inf.	22KΩ	650Ω	
	V 22	2A3	7.5Ω	*125Ω	15KΩ	7.5Ω					
	V 23	2A3	7.5Ω	*125Ω	15KΩ	7.5Ω					
	V 24	2A3	7.5Ω	*125Ω	15KΩ	7.5Ω					
	V 25	2A3	7.5Ω	*125Ω	15KΩ	7.5Ω					
	V 26	5Y3GT	Inf.	6KΩ	Inf.	14KΩ	Inf.	14KΩ	Inf.	6KΩ	
	V 27	5U4GT	Inf.	200KΩ	Inf.	50Ω	Inf.	50Ω	Inf.	200KΩ	
	V 28	5U4GT	Inf.	200KΩ	Inf.	50Ω	Inf.	50Ω	Inf.	200KΩ	

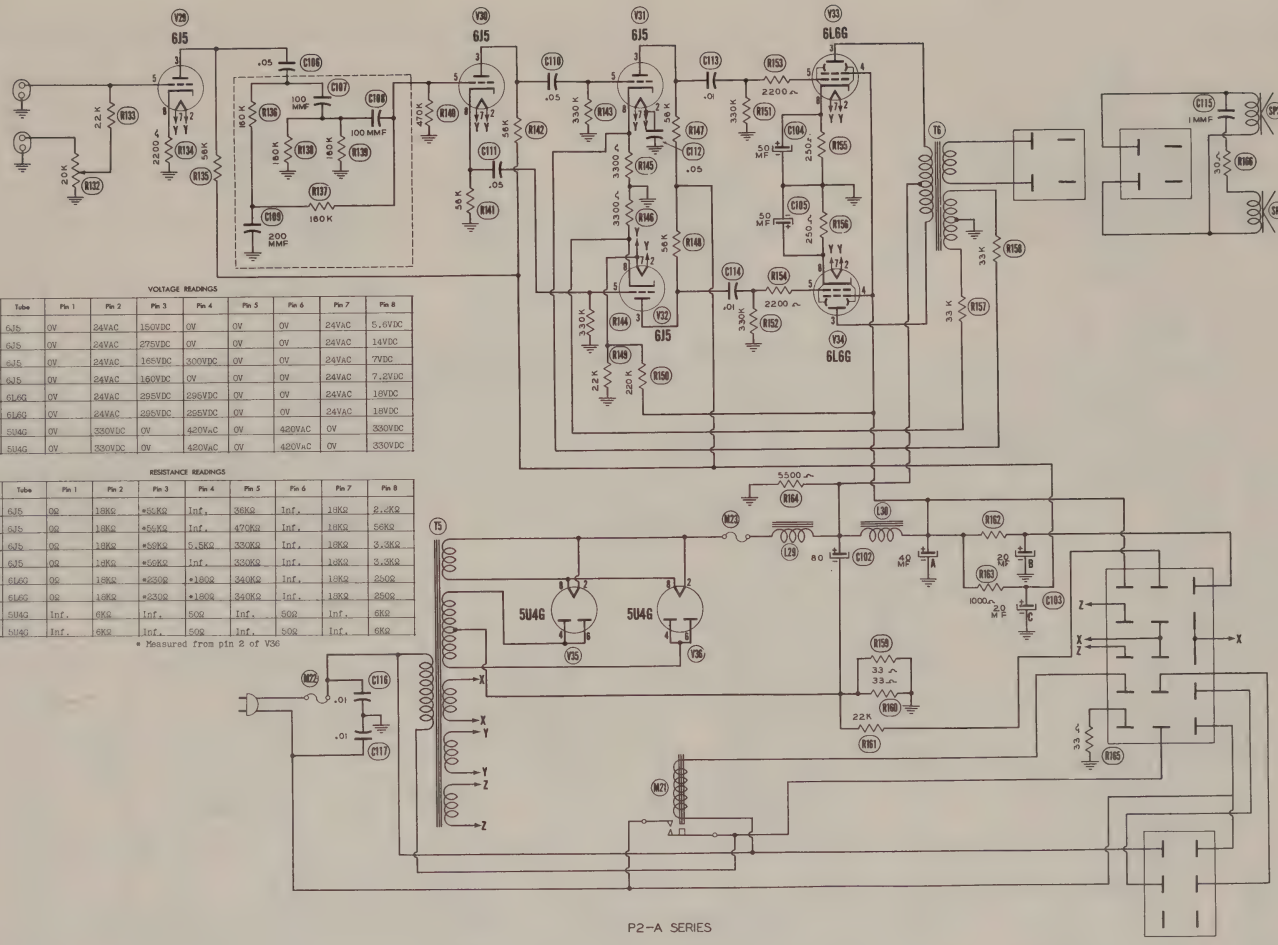
♦ Radio-Phono switch in phono position.
‡ Taken in FM position.
* Measured from pin 8 of V28

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V29	6J5	0V	24VAC	150VDC	0V	0V	0V	24VAC	5.6VDC
V30	6J5	0V	24VAC	275VDC	0V	0V	0V	24VAC	14VDC
V31	6J5	0V	24VAC	165VDC	300VDC	0V	0V	24VAC	7VDC
V32	6J5	0V	24VAC	160VDC	0V	0V	0V	24VAC	7.2VDC
V33	6L6G	0V	24VAC	295VDC	295VDC	0V	0V	24VAC	18VDC
V34	6L6G	0V	24VAC	295VDC	295VDC	0V	0V	24VAC	18VDC
V35	5U4G	0V	330VDC	0V	420VAC	0V	420VAC	0V	330VDC
V36	5U4G	0V	330VDC	0V	420VAC	0V	420VAC	0V	330VDC

RESISTANCE READINGS

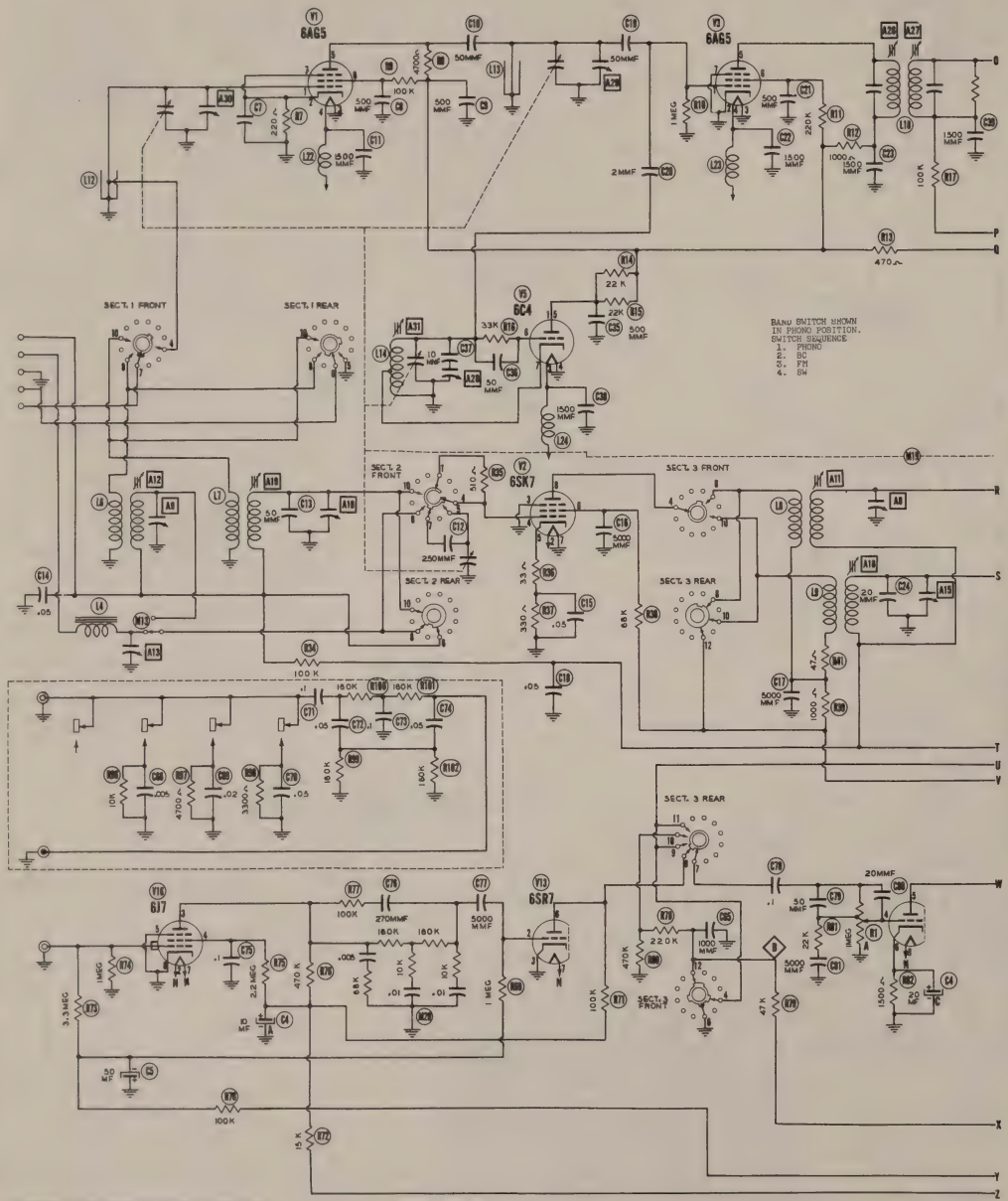
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V29	6J5	0Ω	18KΩ	*85KΩ	Inf.	36KΩ	Inf.	18KΩ	2.4KΩ
V30	6J5	0Ω	18KΩ	*56KΩ	Inf.	470KΩ	Inf.	18KΩ	56KΩ
V31	6J5	0Ω	18KΩ	*58KΩ	5.5KΩ	330KΩ	Inf.	18KΩ	3.3KΩ
V32	6J5	0Ω	18KΩ	*56KΩ	Inf.	330KΩ	Inf.	18KΩ	3.3KΩ
V33	6L6G	0Ω	18KΩ	*230Ω	*180Ω	340KΩ	Inf.	18KΩ	250Ω
V34	6L6G	0Ω	18KΩ	*230Ω	*180Ω	340KΩ	Inf.	18KΩ	250Ω
V35	5U4G	Inf.	6KΩ	Inf.	50Ω	Inf.	50Ω	Inf.	6KΩ
V36	5U4G	Inf.	6KΩ	Inf.	50Ω	Inf.	50Ω	Inf.	6KΩ

* Measured from pin 2 of V36

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949

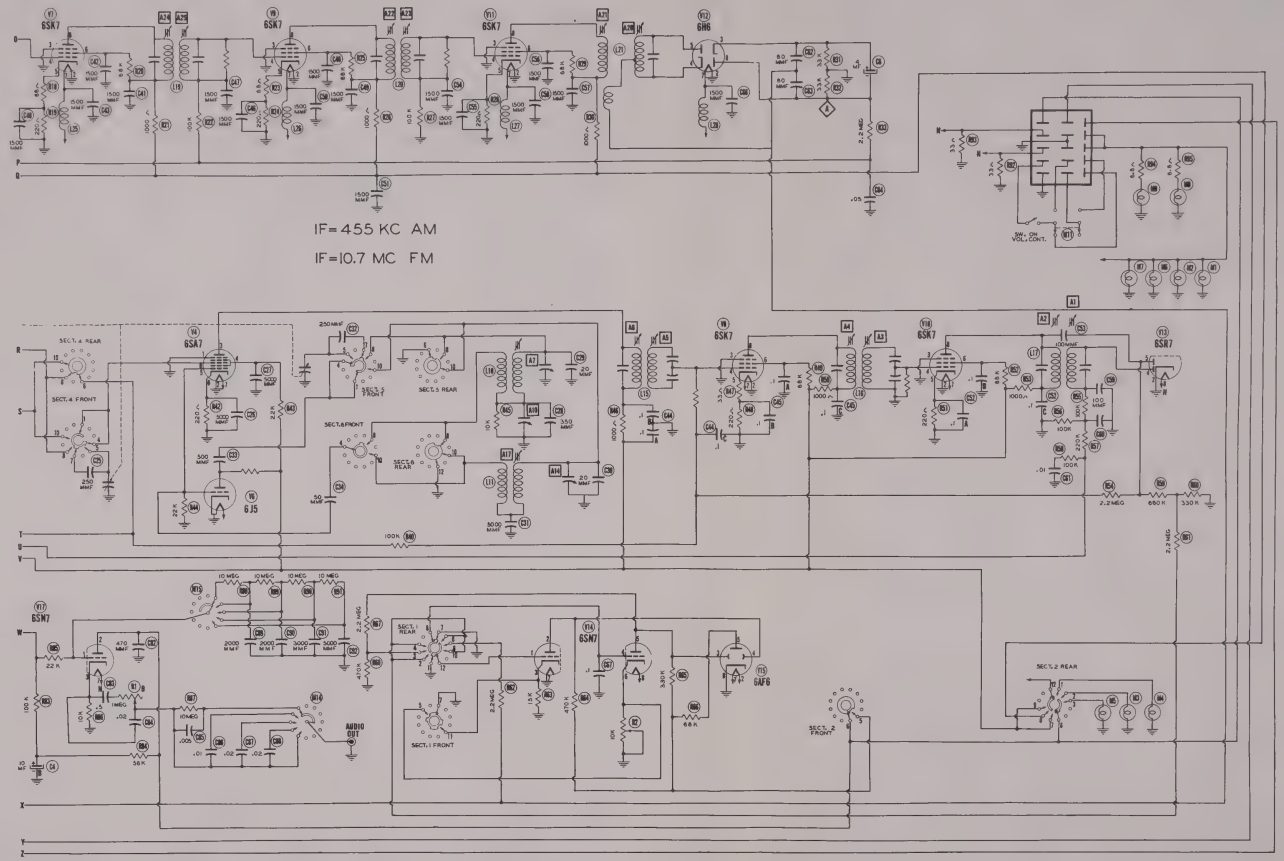
4915-6



A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949

4915-6



A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1949

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap fully closed and set pointer to last reference mark at low frequency end of dial.

The tuning eye balance adjustment is as follows: Remove 3rd FM IF tube (6SK7-V11). Turn band-switch to "FM" position and adjust R2 for balance of the 2 sections of the tuning EY8.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 4 (Grid) 6SK7 (V10). Low side to chassis.	455KC	AM (1 Position clockwise)	Tuning cap fully open	Across voice coil	A1,A2	Adjust for max. output.
2.	.1MFD	High side to pin 4 (Grid) 6SK7 (V9). Low side to chassis.	"	"	"	"	A3,A4	"
3.	.1MFD	High side to pin 8 (Grid) 6SA7 (V4). Low side to chassis.	"	"	"	"	A5,A6	"
4.	200MMF Mica.	High side to either "D" terminal on ant. terminal board. Low side to chassis. Place loop switch in "antenna" position.	1500KC	"	1500KC	"	A7,A8 A9	Adjust for max. output.
5.	200MMF Mica.	"	600KC	"	600KC	"	A10, A11, A12	"
6.	Check calibration at several frequencies. If tracking is not reasonably correct, adjust oscillator coil slug. If oscillator slug is adjusted, it will be necessary to repeat steps 4 and 5.							
7.	Connect dummy loop across L1 & L2 of ant. terminal strip.	Fashion loop of several turns of wire and radiate into dummy loop. Place loop switch in "Loop" position.	1500KC	AM (1 position clockwise)	1500KC	Across voice coil	A13	Adjust for max. output.
8.	400Ω carbon res.	High side to either "D" terminal on ant. terminal strip. Low side to chassis. Place Loop switch in "Ant." position.	15MC	SW (Ext. clockwise position)	15MC	"	A14, A15, A16	Set A14 to maximum capacity. Slowly back out until second signal is heard and adjust for maximum output. Tune receiver dial to 14.09MC and check for image.
9.	400Ω carbon res.	"	9.5MC	"	9.5MC	"	A17, A18, A19	Adjust for max. output. Check image at 8.59MC on radio dial.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
10.	.1MFD	High side to pin 4 (Grid) 6SK7 (V11). Low side to chassis.	10.7MC	FM	Tuning cap fully open	DC Probe to Point ⊖ Common to chassis.	A20, A21	Connect 10KΩ resistor across primary of discriminator transformer (L21) Adjust A20,A21 for max. deflection.
11.	.1MFD	High side to pin 4 (Grid) 6SK7 (V9). Low side to chassis.	"	"	"	"	A22	Connect 2200Ω resistor across secondary of 3rd IF transformer (L20). Adjust A22 (Primary) for max. deflection.
12.	.1MFD	"	"	"	"	"	A23	Remove 2200Ω resistor connected in preceding step and connect it across the primary of same trans. Adjust A23 (Secondary) for maximum deflection.
13.	.1MFD	High side to pin 4 (Grid) 6SK7 (V7). Low side to chassis.	"	"	"	"	A24	Remove 2200Ω resistor of preceding step and connect it across secondary of 2nd IF Trans. (L19). Adjust A24 for max. defl.
14.	.1MFD	"	"	"	"	"	A25	Remove 2200Ω resistor across secondary of 2nd IF Trans. and reconnect across primary. Adjust A25 for maximum deflection.
15.	.1MFD & 10KΩ carbon res.	High side through .1MFD in series with 10KΩ to pin 1 (Grid) 6AG5 (V3). Low side to chassis.	"	"	"	"	A26	Remove 2200Ω resistor from preceding step and connect across secondary of 1st IF Trans. Adjust A26 for max. deflection.
16.	"	"	"	"	"	"	A27	Remove 2200Ω resistor and connect across primary of 1st IF Trans. Adjust A27 for max. deflection.
17.	"	"	"	"	"	DC Probe to Point ⊖ Common to chassis.	A20	Remove 2200Ω resistor from preceding step and 10KΩ resistor connected across discriminator trans secondary in step 10. Adjust A20 for zero reading. A positive and negative reading will be obtained on either side of correct setting. Slightly detune signal generator and slightly retouch A21 for maximum. Reset generator to 10.7MC and adjust A20 for zero. Repeat several times to insure accurate final alignment of discriminator transformer.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	BAND SWITCH POS.	CONNECT SCOPE	ADJUST	REMARKS
10.	.1MFD	High side to pin 4 (Grid) 6SK7 (V11). Low side to chassis.	10.7MC (450KC Sweep)	10.7MC	FM	Vert.Amp. to Point ⊖ Low side to chassis.	A20,A21	Disconnect stabilizer cap. (C6). Adjust A21 for max. symmetry and amplitude as per Fig 1.
11.	.1MFD	"	"	"	"	"	"	Connect 10KΩ resistor across primary of discriminator trans. (L21). Retouch A20 and A21 to obtain max. amplitude & symmetry as per Fig 2.
12.	.1MFD	High side to pin 4 (Grid) 6SK7 (V9). Low side to chassis.	"	"	"	"	A22,A23	Adjust for maximum amplitude & symmetry as per Fig 1.
13.	.1MFD	High side to pin 4 (Grid) 6SK7 (V7). Low side to chassis.	"	"	"	"	A24,A25	"
14.	.1MFD & 10KΩ res.	High side through .1MFD in series with 10KΩ res. to pin 1 (Grid) 6AG5 (V3). Low side to chassis.	"	"	"	"	A26,A27	"
15.	"	"	"	"	"	Vert.Amp. to Point ⊖ Low side to chassis.	A20	Reconnect stabilizer cap (C6) and remove 10KΩ resistor across primary of discriminator transformer. Adjust A20 so cross-over point occurs at 10.7MC marker as per Fig 3. Continue with step 18.

FM-RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
18.	400Ω carbon res.	High side through 400Ω to extreme left hand "D" terminal on ant. terminal strip. Low side to chassis.	108MC	FM	Half way between channels 300 & 301.	DC Probe to Point ⊖ Common lead to chassis.	A28	Turn A28,A29,A30 to max. capacity. Slowly back out A28 until 2nd peak is obtained. Adjust for max. deflection.
19.	"	"	"	"	"	"	A29, A30	Back out A29 and A30 until max. deflection is obtained.
20.	"	"	98MC	"	Half way between channels 200 and 201.	"	A31	Adjust for max. deflection. If necessary, slightly retouch A28 at 108MC, to correct calibration. With no signal input, tuning eye should be balanced if properly adjusted according to pre-alignment instructions. If not balanced, this usually indicates improper FM alignment.

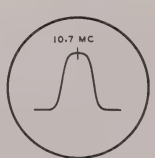
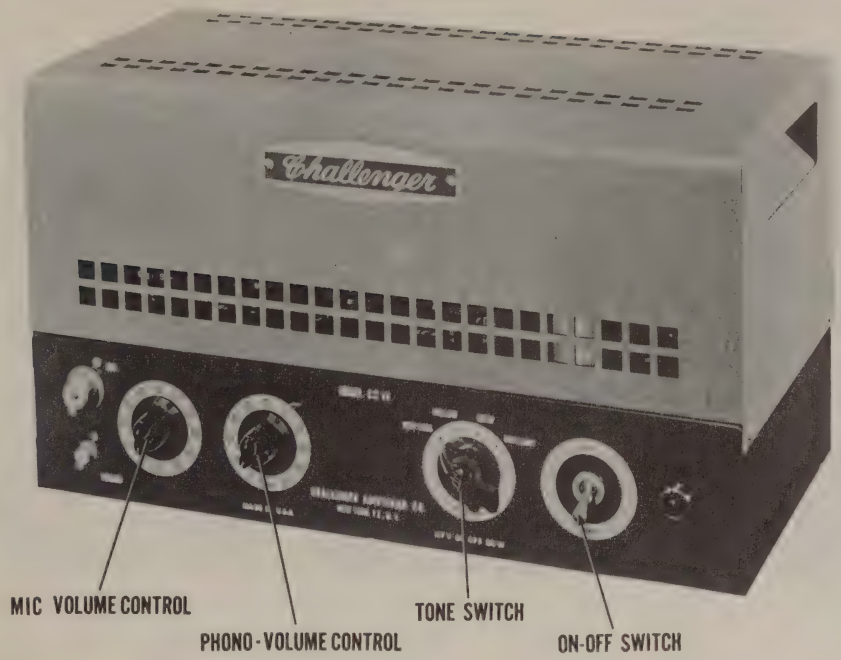


FIG. 1

FIG. 2

FIG. 3



CHALLENGER MODEL CC18

TRADE NAME	Challenger, Model CC18
MANUFACTURER	Challenger Amplifier Co., 663 Broadway, New York 12, New York
TYPE SET	AC Operated 2 Channel Audio Amplifier
TUBES (SIX)	Types 6SF5 Mic. Pre Amp., 6SF5 1st AF Amp., 6SL7GT 2nd AF-Phase Inverter, (2) 6V6GT Power Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING .71 Amp. @ 117 Volts AC

INPUTS: The unit is designed for one high impedance microphone input and one high impedance phonograph input. Connections to the microphone and phonograph input receptacles should be made with high impedance single conductor shielded cable. The shield should be connected to the outer metal portion of the connector which in turn becomes grounded through the input receptacle, to the amplifier chassis.

OUTPUT CONNECTIONS: Speakers having their own field supply or PM types should be used. Speakers may be connected by means of plugs to the speaker sockets, or they can be connected directly to the speaker output terminal strip. Variable impedances for speaker matching are provided at the speaker output terminal strip and also at the two speaker sockets. The pigtail lead with spade lug varies the impedance at the speaker sockets by connecting the spade lug under the terminal on the strip which provides the nearest impedance desired. Both the speaker sockets and terminal strip may be used simultaneously but the pigtail spade lug must be connected to a terminal on the strip in order to operate from the speaker sockets. Connecting the pigtail spade lug will not interfere with the use of the terminal strip for connecting speakers.

CHALLENGER
MODEL CC18

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

CHALLENGER MODEL CC18

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CHALLENGER PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Mic. Pre Amp.		6SF5	6AB	
V2	1st AF		6SF5	6AB	
V3	2nd AF-Phase Inv.		6SL7GT	8BD	
V4	Power Output		6V6GT	7AC	
V5	Power Output		6V6GT	7AC	
V6	Rectifier		5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CHALLENGER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	8	500		GL450/8-8	EB10018		D-2x8-450	PLS-88	Filter-Red & Black
B	8	500							Filter- Blue & Yellow
C2A	5	450		AF2222J	UP		DY-4x10	EL-410	2nd AF Phase Inv. Dec.
B	5	450			111145		-450		1st AF Plate Decoupling
C	5	450							MIC Pre Amp. Plate Dec.
D	5	450							Output Screen Bypass
C3	50	50		PRS50/50	BR505		M-50-50	TA-550	Output Cath. Bypass
C4	.03	400		P488-03	GT4S3		ST-6-03	TM-13	Audio Coupling
C5	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C6	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	1st AF Cath. Bypass
C7	.03	400		P488-03	GT4S3		ST-6-03	TM-13	Audio Coupling
C8	500	500		1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	Tone Compensation
C9	.003	600		P688-003	GT6D3	GP2M-003	ST-6-003	TM-23	Tone Compensation
C10	.003	600		P688-003	GT6D3	GP2M-003	ST-6-003	TM-23	Tone Compensation
C11	.1	400		P488-1	GT4P1		ST-4-1	TM-1	Audio Coupling
C12	.1	400		P488-1	GT4P1		ST-4-1	TM-1	Audio Coupling
C13	.001	600		P688-001	GT6D1	GP2L-001	ST-6-001	TM-21	Tone Compensation
C14	.1	400		P488-1	GT4P1		ST-4-1	TM-1	Line Filter

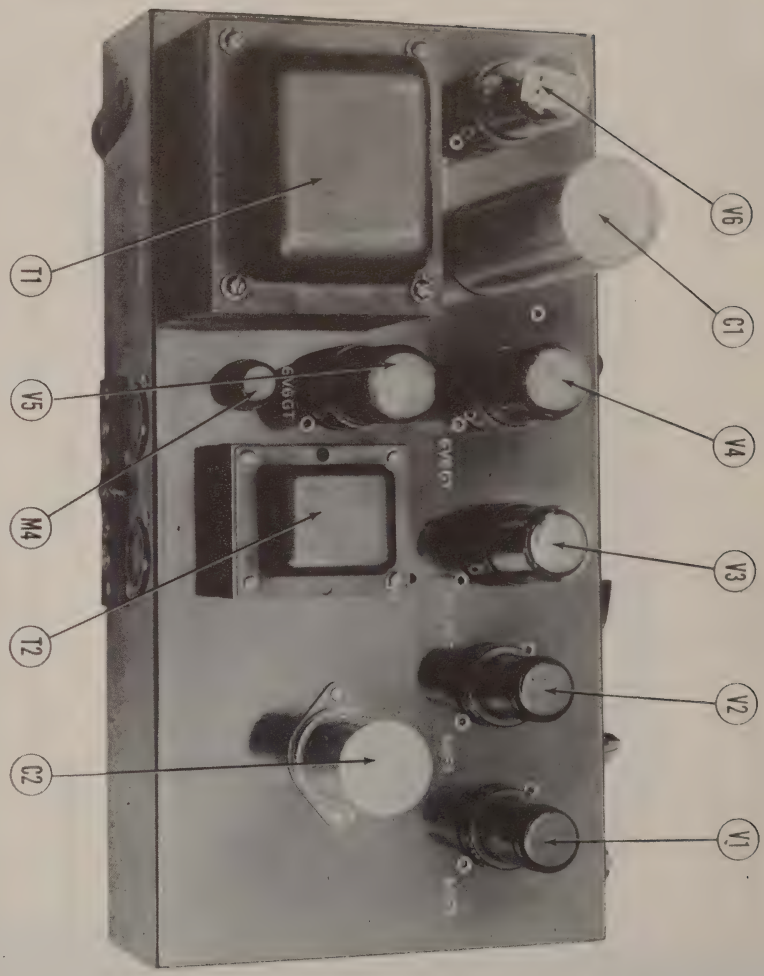
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CHALLENGER PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	500KΩ	½	V202-A	Q13-133	M-60-Z	Mike Control
R2	500KΩ	½	V202-A	Q13-133	M-60-Z	Phono Control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CHALLENGER PART No.	IRC PART No.	IDENTIFICATION CODES
R3	1 Meg.	½		BTS-1 Meg.	Mike Pre Amp. Grid
R4	100KΩ	½		BTS-100K	Mike Pre Amp. Plate
R5	220KΩ	½		BTS-220K	Isolation
R6	500KΩ	½		BTS-470K	Isolation
R7	100KΩ	½		BTS-100K	Filter
R8	500KΩ	½		BTS-470K	1st AF Grid
R9	2200Ω	½		BTS-2200	1st AF Cathode
R10	100KΩ	½		BTS-100K	1st AF Plate
R11	47KΩ	½		BTS-47K	Filter
R12	100KΩ	½		BTS-100K	Tone Compensation
R13	100KΩ	½		BTS-100K	Tone Compensation
R14	47KΩ	½		BTS-47K	Tone Compensation
R15	47KΩ	½		BTS-47K	Tone Compensation
R16	500KΩ	½		BTS-470K	2nd AF Grid
R17	100KΩ	½		BTS-100K	2nd AF Plate
R18	2200Ω	½		BTS-2200	2nd AF Cathode
R19	2200Ω	½		BTS-2200	Phase Inv. Cathode
R20	100KΩ	½		BTS-100K	Phase Inv. Plate

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	CHALLENGER PART No.	IRC PART No.	
R21	8200Ω	½		BTS-8200	Phase Inv. Grid
R22	100KΩ	½		BTS-100K	Output Grid
R23	100KΩ	½		BTS-100K	Output Grid
R24	270Ω	2		BW-2-270	Output Cathode
R25	100KΩ	1		BTA-100K	Output Screen Bleeder
R26	15KΩ	2		BT-2-15K	Output Screen Dropping
R27	300Ω	4		AB-300	Filter
R28	150Ω	2			Surge Limiter
R29	47KΩ	½		BTS-47K	Filter

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	CHALLENGER PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ .71A	640VCT @ .081A DC	5VAC @ 2A	6.6VAC @ 2A	T-367-B	P-6165*	PCR-70*	P-2955*

*Drill New Mounting Holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		CHALLENGER PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	15KΩ CT	4Ω 8Ω 15Ω 70V	260Ω CT	.4Ω .5Ω .7Ω 10Ω	T-278-B		RO-111		

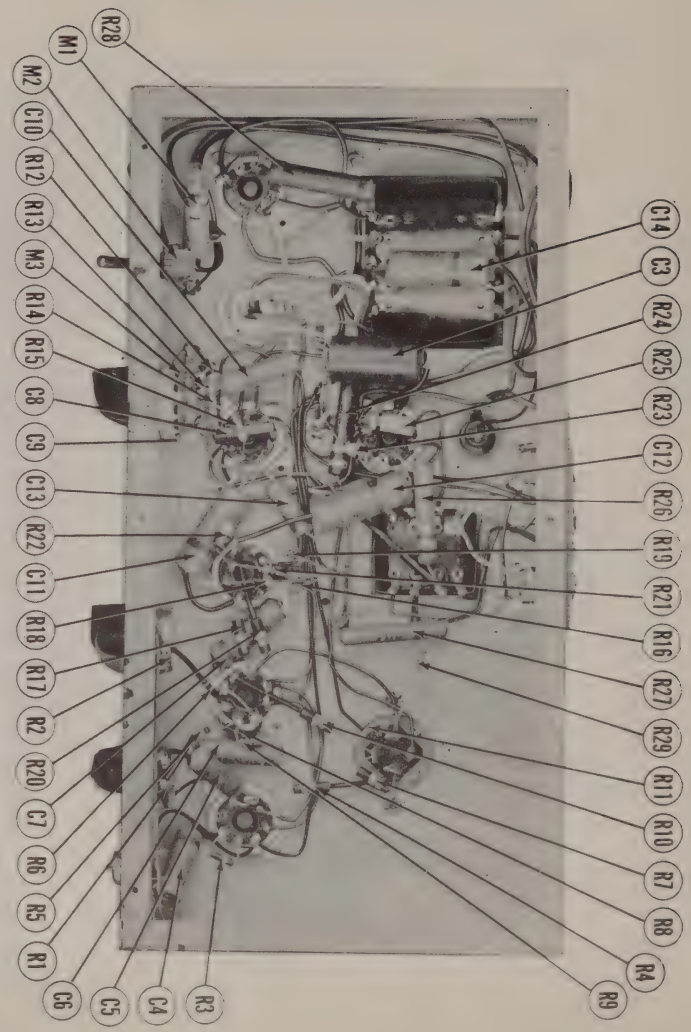
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					CHALLENGER PART No.		
M1	Bayonet	6-8V	0.15A	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	CHALLENGER PART No.	NOTES
M2	Switch		Power
M3	Switch		Tone
M4	Fuse		2 Amp.

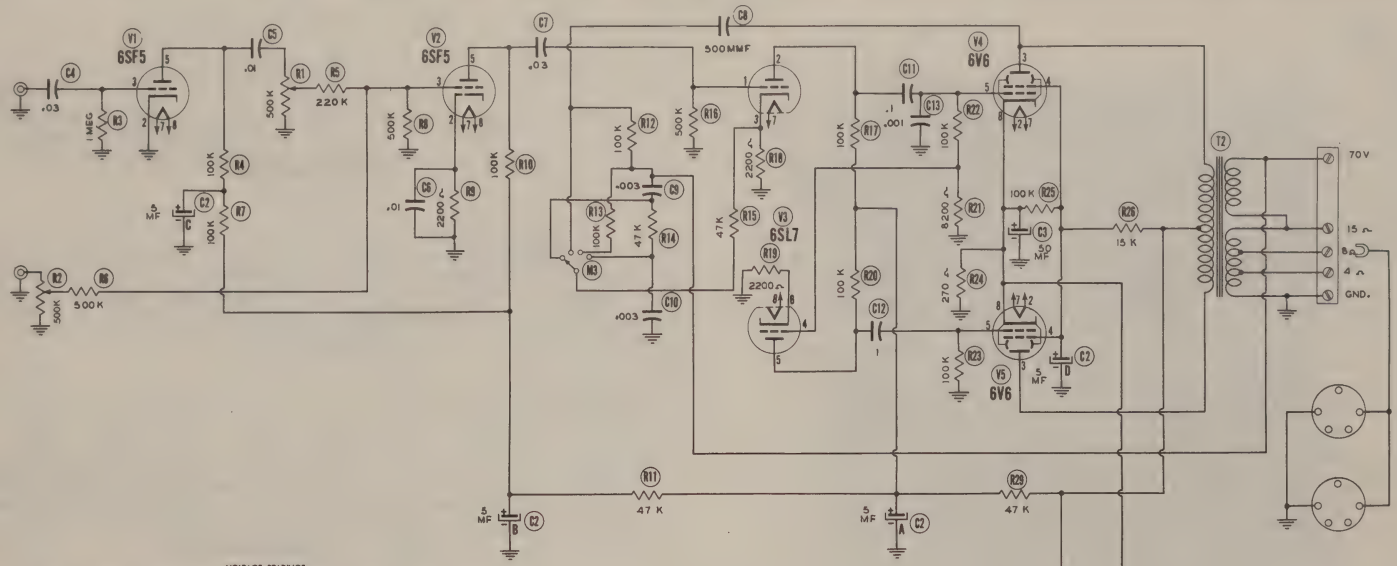
CHASSIS—BOTTOM VIEW



CHALLENGER MODEL C21A

CHALLENGER MODEL CC19

8/49 491S-7 SST #67 FOLDER #7



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	0V	0V	-.7VDC	0V	95VDC	95VDC	±24VAC	±24VAC
V 2	6SF5	0V	1.3VDC	0V	0V	150VDC	270VDC	±24VAC	±24VAC
V 3	6SL7GT	0V	180VDC	1.7VDC	0V	180VDC	1.7VDC	±24VAC	±24VAC
V 4	6V6GT	0V	±24VAC	400VDC	315VDC	0V	1.7VDC	±24VAC	22VDC
V 5	6V6GT	0V	±24VAC	400VDC	315VDC	0V	0V	±24VAC	22VDC
V 6	5Y3GT	0V	440VDC	0V	410VAC	430VDC	410VAC	0V	440VDC

±6.3VAC Measured Between Pins On Each Socket.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	0Ω	0Ω	1 Meg.	Inf.	*270KΩ	*270KΩ	270Ω	270Ω
V 2	6SF5	0Ω	2.2KΩ	220KΩ	0Ω	*170KΩ	*40KΩ	270Ω	270Ω
V 3	6SL7GT	500KΩ	*140KΩ	2.2KΩ	6.2KΩ	*140KΩ	2.2KΩ	270Ω	270Ω
V 4	6V6GT	0Ω	270Ω	*600Ω	*15KΩ	120KΩ	2.2KΩ	270Ω	270Ω
V 5	6V6GT	0Ω	270Ω	*560Ω	*15KΩ	120KΩ	Inf.	270Ω	270Ω
V 6	5Y3GT	0Ω	100KΩ	Inf.	100Ω	100KΩ	90Ω	Inf.	100KΩ

*Measured From Pin 8 Of V6.

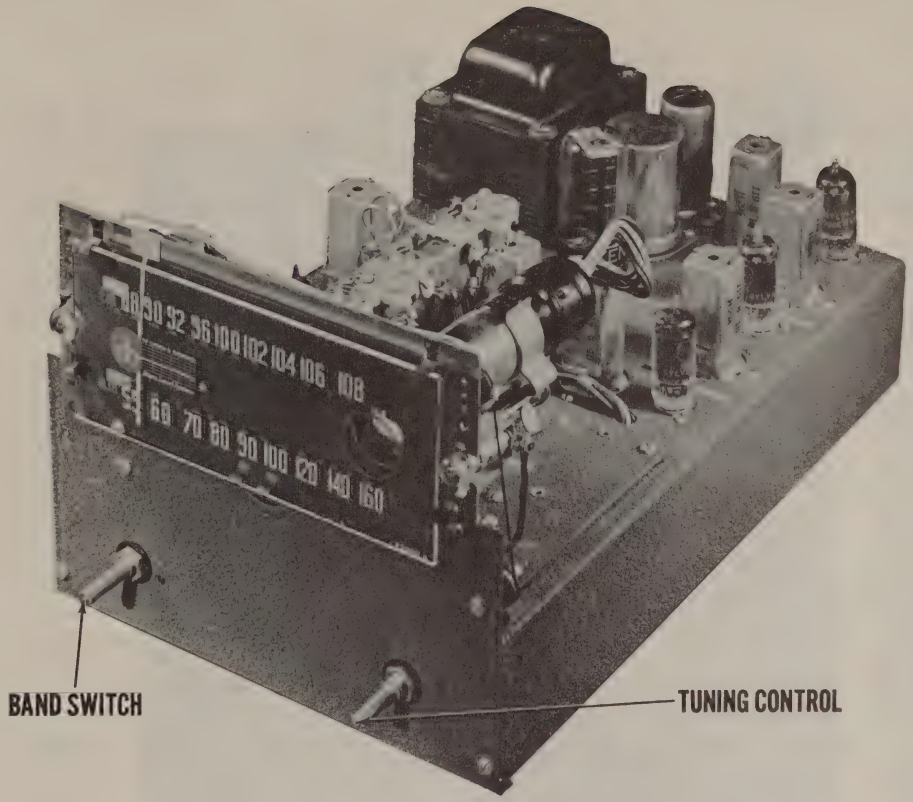
A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1949

4915-7

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.

DAVID BOGEN
MODEL R602



DAVID BOGEN
MODEL R602

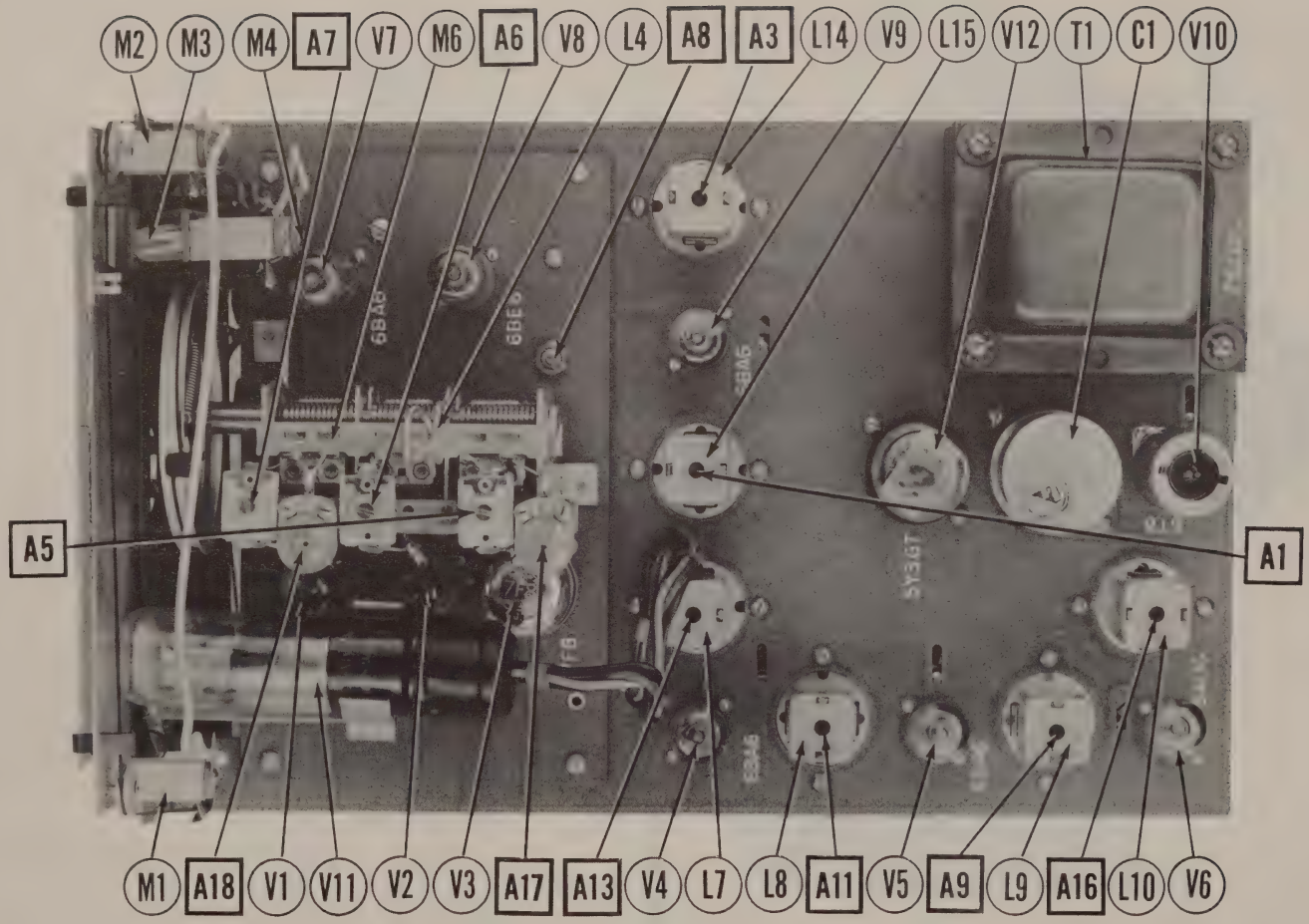
DAVID BOGEN MODEL R602

TRADE NAME	David Bogen, Model R602
MANUFACTURER	David Bogen Co., Inc., 663 Broadway, New York 12, New York
TYPE SET	AC Operated AM-FM Superheterodyne Tuner
TUBES(TWELVE)	Types 6J6 FM RF Amp., 6BA6 FM Mixer, 7F8 FM Osc.-AFC, 6BA6 FM 1st IF, 6BA6 FM 2nd IF, 6AU6 Limiter, 6BA6 AM RF Amp., 6BE6 AM Converter, 6BA6 AM IF, 6T8 DET.-AVC-AF, 6E5 Tuning Ind., 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC — RATING: .55 Amp.@ 117 Volts AC
TUNING RANGE-BROADCAST	540-1630KC — FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

8/49 4915-8 SET #67 FOLDER #8


M2
M3
M4
A7
V7
M6
A6
V8
L4
A8
A3
L14
V9
L15
V12
T1
C1
V10
A5
A1
M1
A18
V1
V11
V2
V3
A17
A13
V4
L7
L8
A11
V5
A9
L9
A16
L10
V6

C9
R4
C8
C11
R3
R5
C6
C3
L3
R2
C4
L2
C14
R6
C5
C7
L11
C35
L12
C29
R29
C30
M5
C31
R30
R35
R31
C34
C33
C32
R33
R34
L13
L5
R52
R38
R37
R53
R40
R41
C40
R46
C48
C2
R45
C47
L1
C37
A2
C36
A4
C38
C12
R36
R32
C39
R16
C19
C18
C15
R11
C16
R8
R7
R10
R9
R12
R13
A
L6
A14
R15
C10
R17
A1
C17
C20
R20
R18
C22
C25
C21
R19
B
R21
C23
A10
C24
R24
R23
C28
R28
C26
C27
R25
R27
R26
D
C42
R47
C
R48
A15
C43
C45
R50
R49
R14
C46
R42
R43
R1
R44
C44
R22
C41
R39

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: DAVID BOGEN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	FM RF Amp.	6J6	6J6	7BF	
V2	FM Mixer	6BA6	6BA6	7BK	
V3	FM Osc.-AFC	7F8	7F8	8BW	
V4	FM 1st IF	6BA6	6BA6	7BK	
V5	FM 2nd IF	6BA6	6BA6	7BK	
V6	Limiter	6AU6	6AU6	7BK	
V7	AM RF Amp.	6BA6	6BA6	7BK	
V8	AM Converter	6BE6	6BE6	7CH	
V9	AM IF Amp.	6BA6	6BA6	7BK	
V10	DET-AFC-AF	6T8	6T8		
V11	Tuning Indicator	6E5	6E5	6R	
V12	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: DAVID BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	5	450		AF2222J	UP1111		DY-4x10	EL-410	Filter
B	5	450			45		-450		Filter
C	5	450							Filter
D	5	450							AF Plate Decoupling
C2	8	450		PRS450/8	BR845		M-8-450	UT-8	Filter
C3	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM RF Cath. Bypass
C4	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM RF Fil. Bypass
C5	5000			1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Coupling
C6	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM RF Plate Decoupling
C7	25	500		1468-000025	5W5Q25	GP1K-25	MO.5-425	MS-425	RF Coupling
C8	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM Mixer Fil. Bypass
C9	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM Mixer Screen Bypass
C10	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM Mixer Plate Decoupling
C11	25	500		1468-000025	5W5Q25	GP1K-25	MO.5-425	MS-425	FM Osc. Grid Cap
C12	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM Osc. Plate Bypass
C13	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM Osc. Fil. Bypass
C14	5	500		1468-000005	5W5V5	NP0K-5	MO.5-55	MS-55	AFC Coupling
C15	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	AFC Cath. Bypass
C16	250	500		1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	AFC Filter
C17	25	500		1468-000025	5W5Q25	GP1K-25	MO.5-425	MS-425	AFC Filter
C18	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM 1st IF Fil. Bypass
C19	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM 1st IF Screen Bypass
C20	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM 1st IF Decoupling
C21	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM 2nd IF Fil. Bypass
C22	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM 2nd IF Screen Bypass
C23	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	FM 2nd IF Decoupling
C24	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Limiter Grid Filter
C25	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Tuning Ind. Filter
C26	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Limiter Fil. Bypass
C27	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Limiter Screen Bypass
C28	10000			P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Limiter Plate Decoupling
C29	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AVC Filter
C30	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AM RF Screen Bypass
C31	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AM RF Plate Decoupling
C32	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AVC Filter
C33	100	500		1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	AM Osc. Grid Filter Note 1
C34	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AM Osc. Anode Bypass
C35	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AM Conv. Plate Bypass
C36	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AVC Filter
C37	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AM IF Screen Bypass
C38	.05	400		P488-05	GT4S5		ST-4-05	TM-15	AM IF Plate Decoupling
C39	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Diode Filter
C40	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Diode Filter
C41	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Audio Coupling Note 2
C42	50	500		1468-00005	5W5Q5		MO.5-45	1FM-45	RF Bypass
C43	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Audio Coupling
C44	.001	600		P688-001	GT6D1	GP2L-001	ST-6-001	TM-21	De-emphasis
C45	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Audio Coupling
C46	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Audio Coupling
C47	.5	400		484-5	GT4P5		ST-4-5	TC-5	Fixed Trimmer
C48	.1	500		P688-1	GT6P1		ST-6-1	TM-1	Line Filter

Note 1. Some Models Use 50MFD In This Application.
Note 2. Not Used In All Models.

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: DAVID BOGEN PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
L1	.046A	190Ω	4.4H	T502	C-1080	R-650*	C-2977	*Drill New Mtg. Holes.

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: DAVID BOGEN PART No.	REPLACEMENT DATA: MEISSNER PART No.
L2	FM Ant.Coil	0Ω		H317	
L3	RF Plate Choke	.1Ω		H314	
L4	FM RF Coil	0Ω		H316	
L5	FM Osc.Coil	0Ω			
L6	RF Plate Choke	.1Ω		H314	
L7	1st FM IF	.5Ω	.5Ω	H294	
L8	2nd FM IF	.5Ω	.5Ω	H294	
L9	3rd FM IF	.5Ω	.5Ω	H294	
L10	FM Disc. XFMR.	.5Ω	.8Ω	H294	
L11	AM Ant.Coil	35Ω	4.8Ω	H249	
L12	AM RF Coil	85Ω	5Ω	H248	
L13	AM Osc.Coil	5.5Ω		H250	14-1060
L14	1st AM IF	18Ω	18Ω	H297	16-6678
L15	2nd AM IF	10Ω	10Ω	H296	16-6678

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: DAVID BOGEN PART No.	REPLACEMENT DATA	NOTES
M1	Bayonet	6-8V	0.2A	White			Type #51
M2	Bayonet	6-8V	0.2A	White			Type #51
M3	Bayonet	6-8V	0.15A	Brown			Type #47
M4	Bayonet	6-8V	0.15A	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	DAVID BOGEN PART No.	NOTES
M5	Switch		Band
M6	Tuning Gang.		AM-FM

8/69 4915-B EER #67 FOLDER #8

PARTS LIST AND DESCRIPTIONS (Continued)

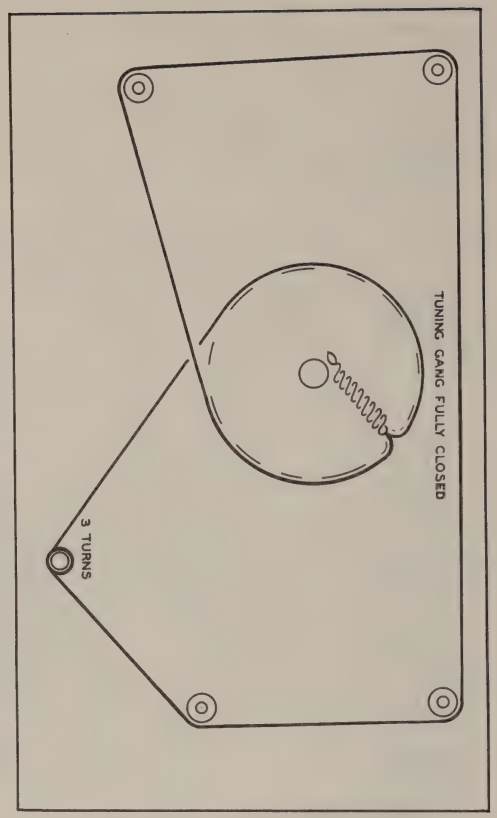
RESISTORS

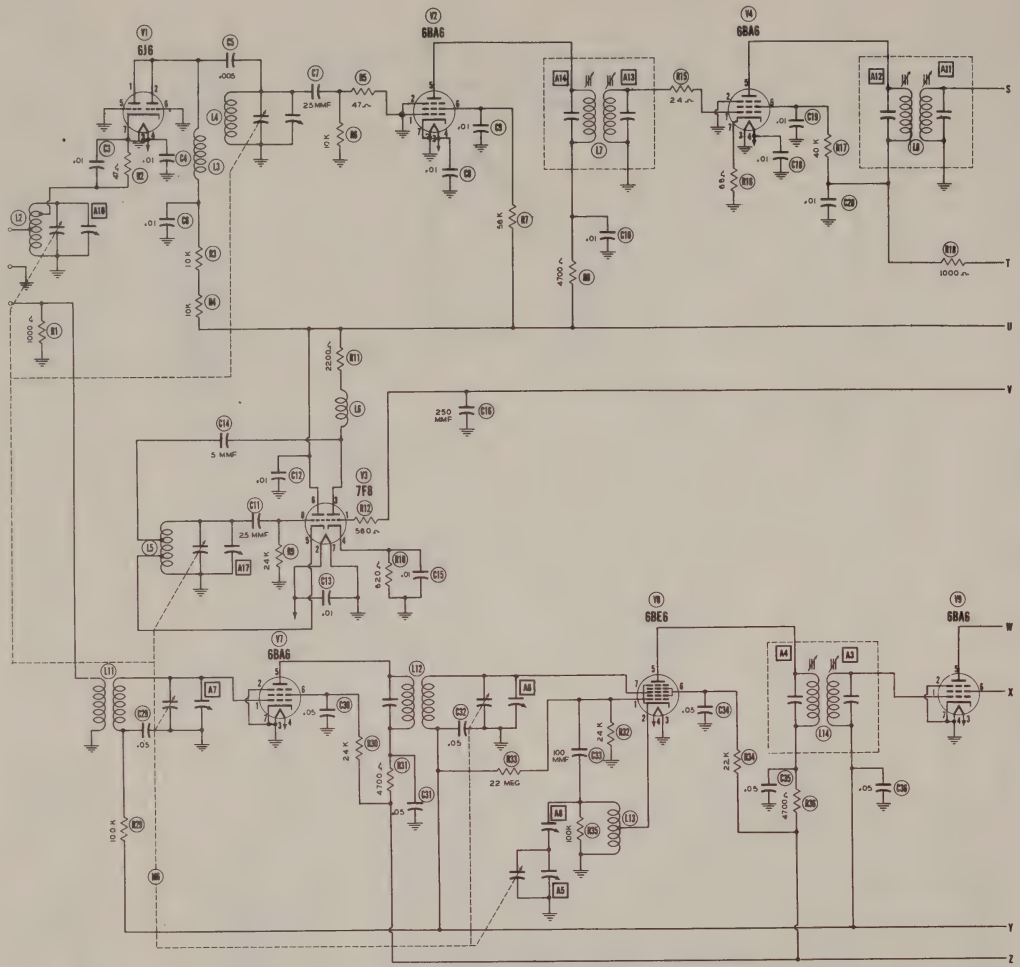
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	DAVID BOGEN PART No.	IRC PART No.	
R1	1000Ω	½		BTS-1000	Ant. Loading
R2	47Ω	½		BW-½-47	FM RF Cathode
R3	10KΩ	2		BT-2-10K	Voltage Dropping
R4	10KΩ	2		BT-2-10K	Voltage Dropping
R5	47Ω	½		BW-½-47	Parasitic Suppressor
R6	10KΩ	½		BTS-10K	Mixer Grid
R7	56KΩ	½		BTS-56K	Mixer Screen
R8	4700Ω	½		BTS-4700	Mixer Plate Decoupling
R9	24KΩ	½		BTS-22K	FM Osc. Grid
R10	620Ω	½		BW-½-680	FM AFC Cathode
R11	2200Ω	½		BTS-2200	FM AFC Plate
R12	560Ω	½		BW-½-560	FM AFC Grid
R13	100KΩ	½		BTS-100K	AFC Filter
R14	220KΩ	½		BTS-220K	AFC Filter
R15	24Ω	½		BW-½-22	FM IF Grid
R16	68Ω	½		BW-½-68	FM IF Cathode
R17	40KΩ	½		BTA-39K	FM IF Screen
R18	1000Ω	½		BTS-1000	FM IF Decoupling
R19	24Ω	½		BW-½-22	2nd FM IF Grid
R20	68Ω	½		BW-½-68	2nd FM IF Cathode
R21	40KΩ	½		BTA-39K	2nd FM IF Screen
R22	3000Ω	7		AB-3000	Voltage Dropping
R23	220KΩ	½		BTS-220K	Tuning Eye Filter
R24	47KΩ	½		BTS-47K	Limiter Grid
R25	47KΩ	½		BTS-47K	Voltage Divider
R26	150KΩ	½		BTS-150K	Voltage Divider
R27	100KΩ	½		BTS-100K	Voltage Divider
R28	150KΩ	½		BTS-150K	Voltage Divider
R29	100KΩ	½		BTS-100K	AVC Network
R30	24KΩ	½		BTA-22K	AM RF Screen
R31	4700Ω	½		BTS-4700	AM RF Plate Decoupling
R32	24KΩ	½		BTS-22K	AM Osc. Grid
R33	22 Meg.	½		BTS-22 Meg.	AVC Network
R34	22KΩ	½		BTA-22K	AM Osc. Anode
R35	100KΩ	½		BTS-100K	AM Osc. Coil Shunt
R36	4700Ω	½		BTS-4700	AM Conv. Plate Decoupling
R37	24KΩ	½		BTA-22K	AM IF Screen
R38	4700Ω	½		BTS-4700	AM IF Plate Decoupling
R39	1 Meg.	½		BTS-1 Meg.	AVC Network
R40	47KΩ	½		BTS-47K	Diode Filter
R41	100KΩ	½		BTS-100K	Diode Load
R42	220KΩ	½		BTS-220K	Tone Compensation
R43	10 Meg.	½		BTS-10 Meg.	AF Grid
R44	100KΩ	½		BTS-100K	AF Plate
R45	100KΩ	½		BTS-100K	Voltage Divider
R46	220KΩ	½		BTS-220K	Voltage Divider
R47	100KΩ	½		BTS-100K	Disc. Load
R48	100KΩ	½		BTS-100K	Disc. Load
R49	220KΩ	½		BTS-220K	Tone Compensation
R50	100KΩ	½		BTS-100K	De-emphasis
R51	1 Meg.	½		BTS-1 Meg.	Tuning Eye Plate
R52	3000Ω	7		AB-3000	Voltage Dropping
R53	1000Ω	7		AB-1000	Filter

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	DAVID BOGEN PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ .55A	730VCT .046A DC	5VAC @ 2A	6.3VAC @ 4A	T377BU	P-6013*	PH-70B	P-2952*

*Drill New Mounting Holes.





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
#V1	6J6	70VDC	70VDC	0V	6.3VAC	0V	0V	.6VDC		
#V2	6BA6	-.7VDC	0V	0V	6.3VAC	270VDC	86VDC	0V		
#V3	7F8	0V	0V	300VDC	3VDC	0V	310VDC	6.3VAC	5-1VDC	
#V4	6BA6	0V	0V	0V	6.3VAC	225VDC	90VDC	.6VDC		
#V5	6BA6	0V	0V	6.3VAC	0V	235VDC	90VDC	.6VDC		
#V6	6AU6	-.4VDC	0V	0V	6.3VAC	80VDC	34VDC	0V		
V 7	6BA6	-.4VDC	0V	0V	6.3VAC	185VDC	125VDC	0V		
V 8	6BE6	5-7.8 VDC	0V	0V	6.3VAC	225VDC	90VDC	-.5VDC		
V 9	6BA6	-.5VDC	0V	0V	6.3VAC	0V	170VDC	108VDC	0V	
#V10A	6T8	-.8VDC	-.8VDC	0V	6.3VAC	0V	-.8VDC	0V	-.8VDC	100VDC
#V10B	6T8	-.9VDC	-.9VDC	0V	6.3VAC	0V	-.8VDC	0V	-.8VDC	117VDC
V11	6E5	6.3VAC	50VDC	-.5VDC	410VDC	0V	0V			
V12	5Y3GT	0V	425VDC	0V	360VDC	0V	360VAC	250VDC	425VDC	

#TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

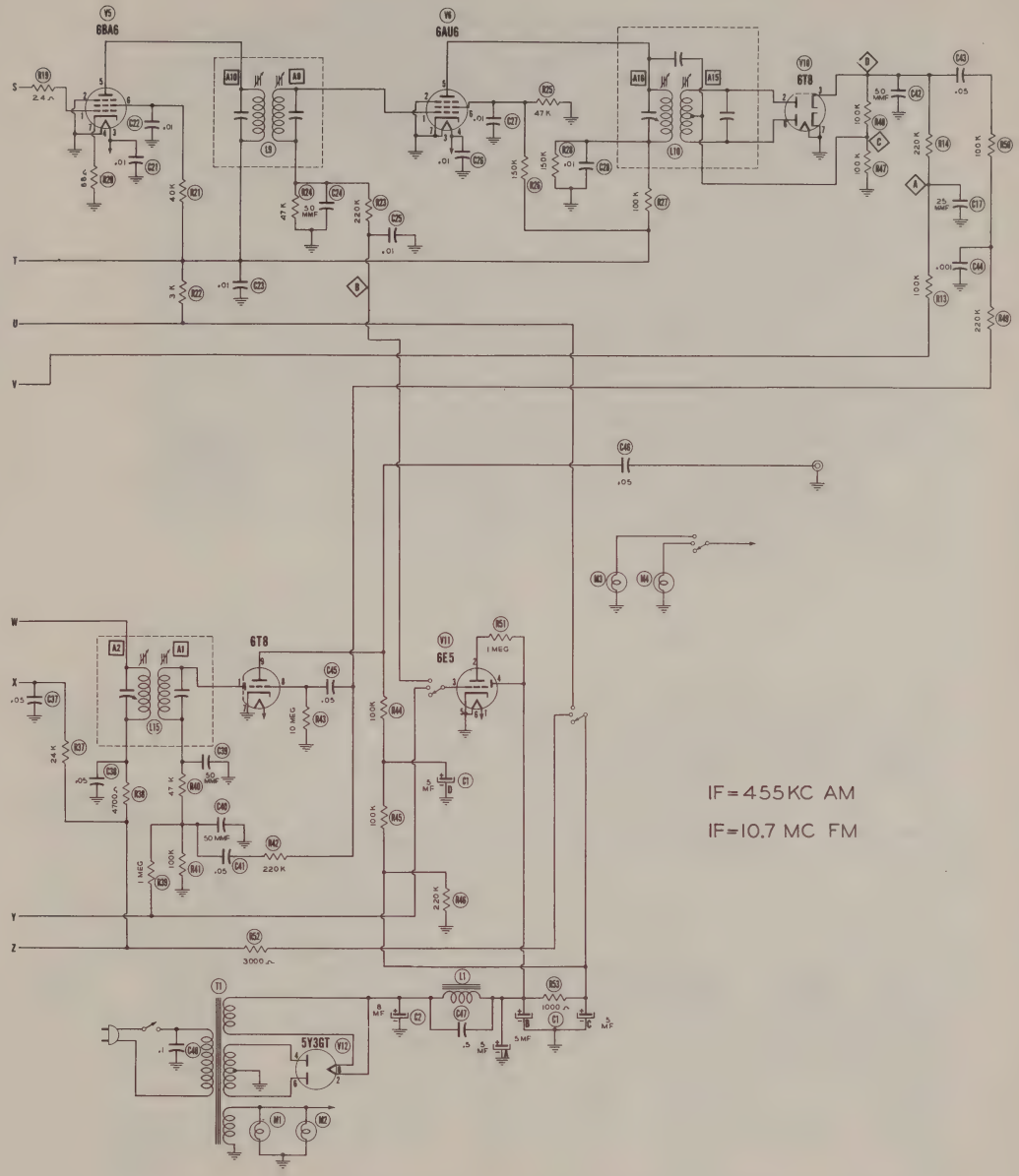
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
#V1	6J6	*21KΩ	*21KΩ	0Ω	.2Ω	0Ω	0Ω	47Ω		
#V2	6BA6	10KΩ	0Ω	0Ω	.2Ω	*5.7KΩ	*60KΩ	0Ω		
#V3	7F8	550KΩ	0Ω	*3.2KΩ	620Ω	0Ω	*1200Ω	.2Ω	25KΩ	
#V4	6BA6	24Ω	0Ω	0Ω	.2Ω	*5KΩ	*46KΩ	68Ω		
#V5	6BA6	24Ω	0Ω	.2Ω	0Ω	*4KΩ	*46KΩ	68Ω		
#V6	6AU6	47KΩ	0Ω	0Ω	.2Ω	*75KΩ	*80KΩ	0Ω		
V 7	6BA6	1 Meg.	0Ω	0Ω	.2Ω	*2KΩ	*27KΩ	0Ω		
V 8	6BE6	24KΩ	.5Ω	0Ω	.2Ω	*5KΩ	*27KΩ	1 Meg.		
V 9	6BA6	1 Meg.	0Ω	.2Ω	0Ω	*10KΩ	*30KΩ	0Ω		
#V10A	6T8	140KΩ	100KΩ	200KΩ	.2Ω	0Ω	100KΩ	0Ω	10 Meg.	*200KΩ
#V10B	6T8	140KΩ	100KΩ	200KΩ	.2Ω	0Ω	100KΩ	0Ω	10 Meg.	*200KΩ
V11	6E5	.2Ω	*1 Meg.	1 Meg.	*200Ω	0Ω	0Ω			
V12	5Y3GT	Inf.	120KΩ	Inf.	130Ω	Inf.	120Ω	100KΩ	100KΩ	

*Measured From Pin 2 Of V12.

VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949



1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1949

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to center AM stator of tuning cap. Low side to chassis.	455KC	AM	Tuning cap fully open	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2.	500MMF	High side to AM antenna terminal. Low side to chassis.	1630KC	"	"	"	A5	"
3.	500MMF	"	1400KC	"	Tune for maximum signal.	"	A6,A7	"
4.	500MMF	"	600KC	"	600KC	"	A8	Adjust for maximum output. Repeat steps 2 and 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

For the entire FM alignment connect a jumper from point (A) to ground. This disables the AFC circuit to eliminate the AFC action during alignment.

With the VTVM connected to Point (B) and no signal input, the VTVM reading should not exceed 1 volt. If reading is in excess of 1 volt, the IF strip is oscillating. The source of oscillation must be found and eliminated before alignment of the FM IF strip.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to center FM stator of tuning cap. Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC Probe to Point (B) Common to chassis.	A9,A10 A11, A12, A13, A14	Adjust for maximum deflection.
6.	.01MFD	"	"	"	"	DC Probe to Point (C) Common to chassis.	A15	"
7.	.01MFD	"	"	"	"	DC Probe to Point (D) Common to chassis.	A16	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. If A16 required much adjustment, repeat steps 6 and 7.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to center FM stator of tuning cap. Low side to chassis.	10.7MC (450KC Sweep)	FM	Point of non-interference	Vert.Amp. to Point (B) Low Side to chassis.	A9,A10 A11, A12, A13, A14	Adjust for maximum amplitude and symmetry as per Fig 1.
6.	.01MFD	"	"	"	"	Vert.Amp. to Point (D) Common to chassis.	A15, A16	Adjust A15 for maximum amplitude and straightness of crossover lines as per Fig 2. Adjust A16 so crossover point occurs at center of pattern. Continue with step 8.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω carbon res.	High side thru 300Ω to FM Ant. terminal. Low side to chassis.	108MC (Unmod.)	FM	108MC	DC Probe to Point (B) Common to chassis.	A17	Adjust for maximum deflection.
9.	300Ω carbon res.	"	105MC (Unmod.)	"	Tune for maximum signal	"	A18	"

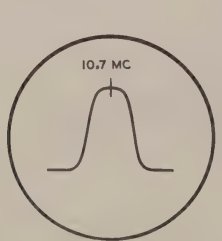


FIG. 1

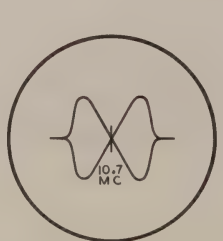
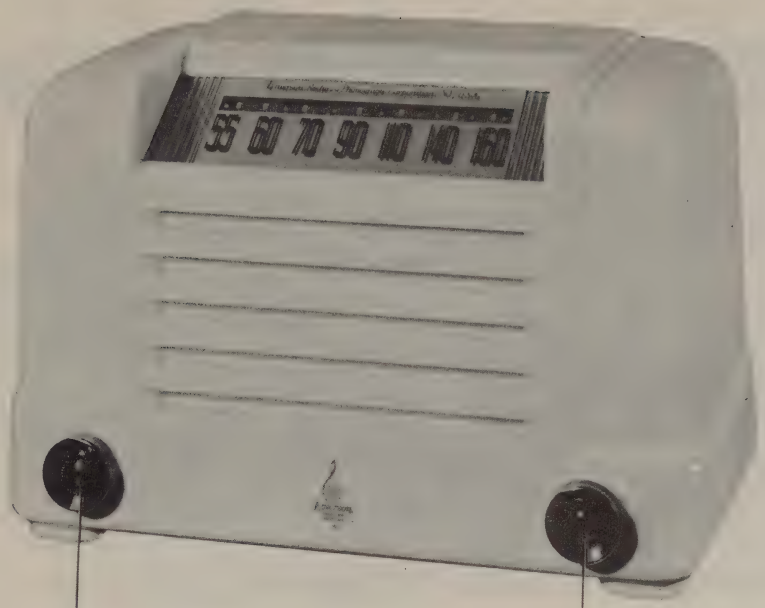


FIG. 2

EMERSON MODEL
591 (Ch. 120055A)



EMERSON MODEL
591 (Ch. 120055A)

EMERSON MODEL 591

TRADE NAME	Emerson, Model 591 (Ch. 120055A)
MANUFACTURER	Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N.Y.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna.
TUBES (SIX)	Types 6SS7 RF Amp., 12SA7 Converter, 6SS7 IF Amp., 12SQ7 DET-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC RATING .26 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning gang fully closed and set pointer at calibration mark near left end of dial backplate.

Use isolation transformer if available. If not, connect a 0.1 MFD condenser in series with low side of signal generator and chassis.

Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading.

Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	0.1MFD	High side to pin 8 (grid) of 12SA7 (V2). Low side to chassis.	455KC	Tuning gang fully open.	Across voice coil.	A1, A2 A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001 MFD to reduce hum modulation.
2.	0.1MFD	High side to external antenna lead. Low side to chassis.	455KC	"	"	A5	Adjust for minimum output.
3.	200MMF	"	1620KC	"	"	A6	Adjust for maximum output.
4.	200MMF	"	1400KC	Tune for maximum output.	"	A7	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

EMERSON MODEL 591

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6SS7	6SS7	8N	
V2	Converter	12SA7	12SA7	8R	
V3	IF Amp.	6SS7	6SS7	8N	
V4	DET-AVC-AF	12SQ7	12SQ7	8Q	
V5	Power Output	50L6GT	50L6GT	7AC	
V6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	150	925104	PRSA150/50	EDL5315		DSB-5030	TA-530	Filter Red
B	50	150		-30			-150		Filter Green
C2	.05	200	920060	P288-05	GT2S5		ST-4-05	TM-15	RF Screen Bypass
C3	110	500	910010	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C4	.05	400	920030	P488-05	GT4S5		ST-4-05	TM-15	RF Bypass
C5	.05	200	920060	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C6A	220		470310	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Diode Filter
B	2000			P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	Audio Coupling
C	220			1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	AF Plate Bypass
D	5000			P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C7	.02	400	920020	P488-02	GT4S2		ST-4-02	TM-12	Output Plate Bypass
C8	.05	400	920030	P488-05	GT4S5		ST-4-05	TM-15	Line Filter

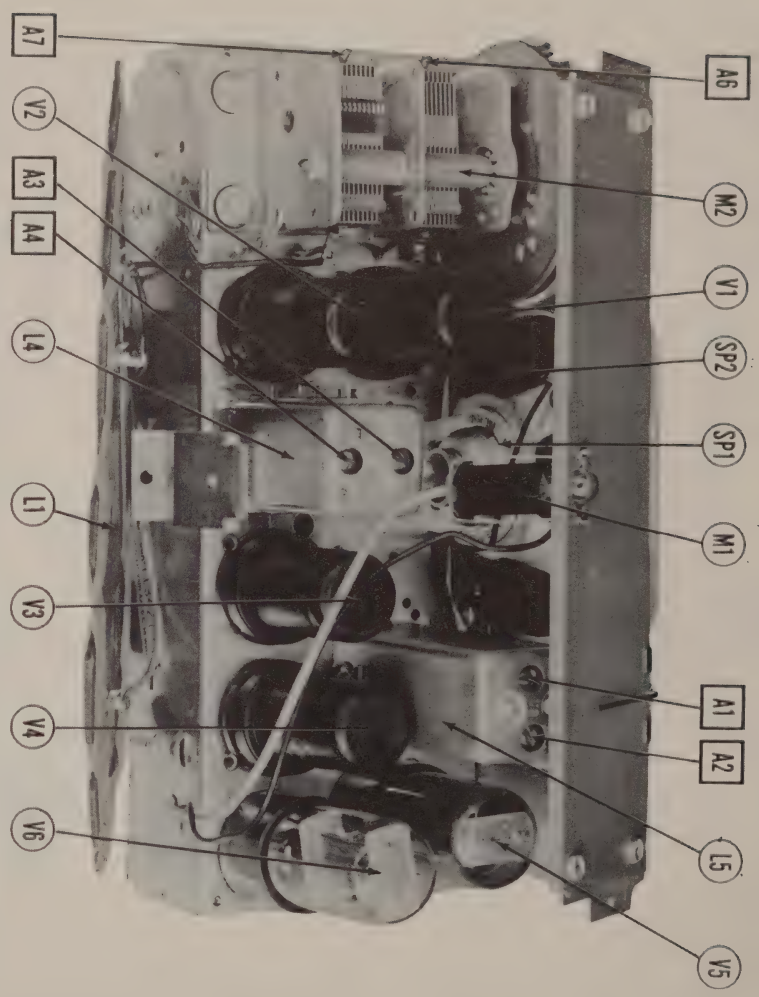
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	390053	Q11-133	AM-58-S	Volume control
B	Shaft			Not Req.	KSS-3	Attach to R1A per instructions
C	Switch			76-1	SW-A	Attach to R1A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	IDENTIFICATION CODES
R2	10KΩ	½	340730	BTS-10K	RF Plate
R3	39KΩ	½	340870	BTS-39K	RF Screen
R4	100KΩ	½		BTS-100K	Conv. Grid
R5	22KΩ	½	340810	BTS-22K	Osc. Grid
R6	15 Meg.	½	351490	BTS-15 Meg.	AVC Network
R7	3.3 Meg.	½	351330	BTS-3.3 Meg	AVC Network
R8	15 Meg.	½	351490	BTS-15 Meg.	AF Grid
R9	470KΩ	½	351130	BTS-470K	AF Plate
R10	470KΩ	½	351130	BTS-470K	Output Grid
R11	150Ω	½	340290	BW-½-150	Output Cathode
R12	1000Ω	1	370490	BW-1-1000	Filter
R13	39Ω	1	370150		Rectifier Ballast

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		EMERSON PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	22000Ω	3.5Ω	192Ω Tap @ 7Ω	.6Ω	734046	A-3330	RO-3	A-3031	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			EMERSON PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V.C. IMP.		ST-1131		
SP1	PM	3.5Ω	180043	MOD.P4-X	4A07	†Drill and tap magnet frame
	CONE DIA.	V.C. DIA.				
SP2	3-7/8"	9/16"				

R F COILS

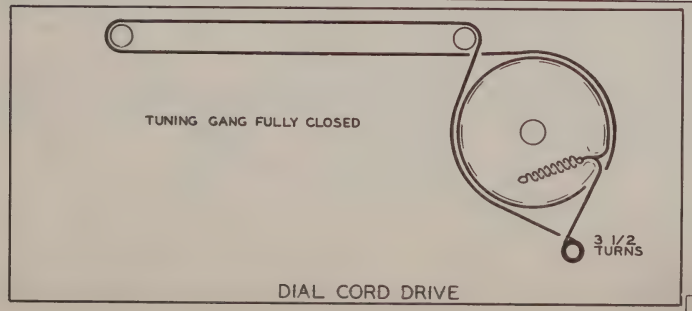
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	EMERSON PART No.	MEISSNER PART No.
L1	Loop Ant.	1.5Ω		700033	
L2	Wave Trap	65Ω		708060	
L3	Osc.Coil	1Ω	6.5Ω	716024	14-1060
L4	Input IF	28Ω	28Ω	720058	16-6658
L5	Output IF	28Ω		720390	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					EMERSON PART No.		
M1	Bayonet	6-8V	.15	Brown	807000		Type #47

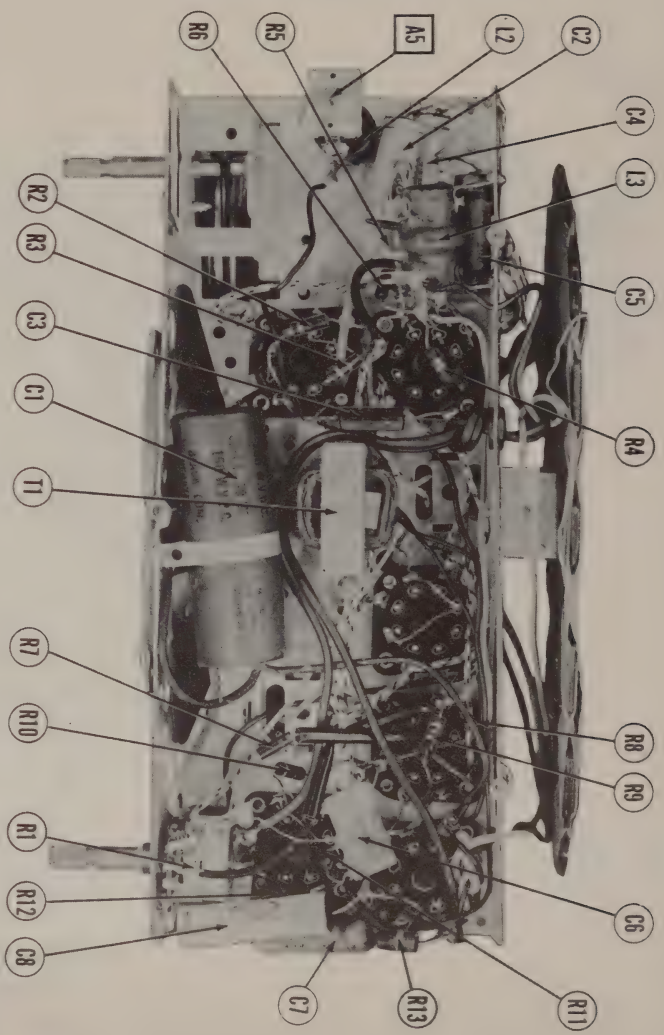
MISCELLANEOUS

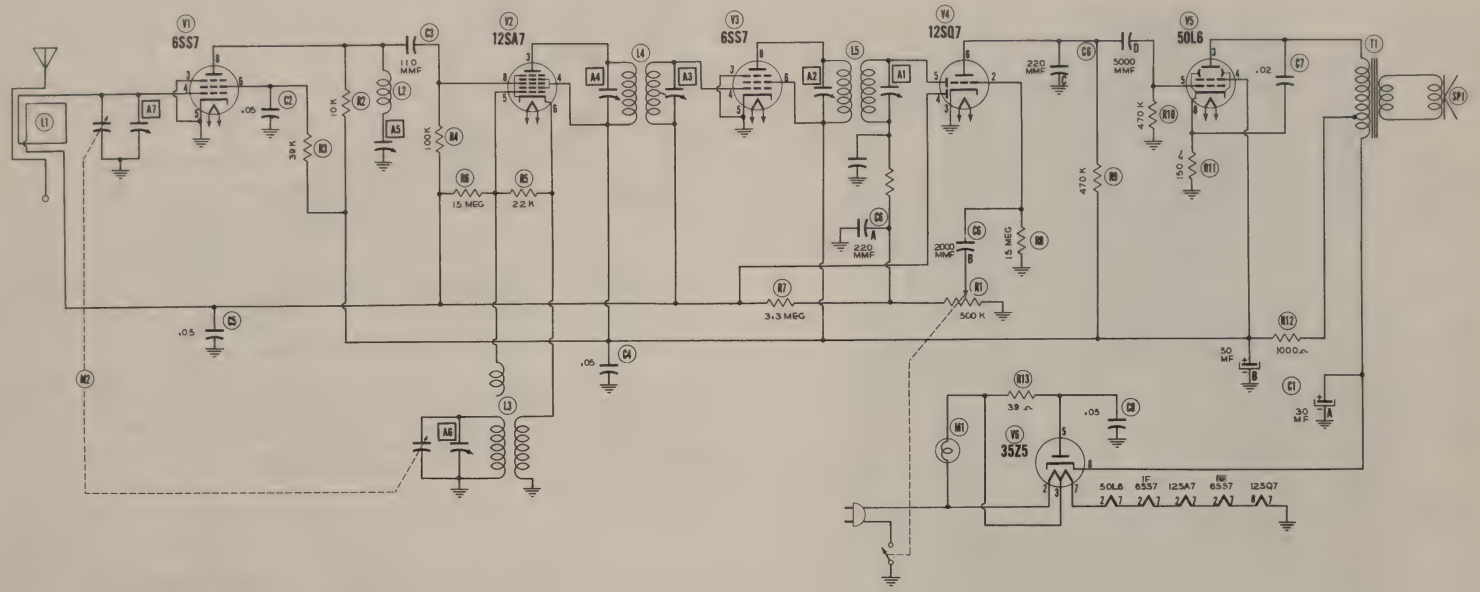
ITEM No.	PART NAME	EMERSON PART No.	NOTES
M2	2 Gang Var. Cap.	900037	(14-377MMF, 14-186MMF)
	Dial Glass	520076	
	Dial Pointer	525035	
	Knob	460470	
	Cabinet	140210	Walnut
	Cabinet	140213	Ivory



DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW





IF=455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SS7	0V	18VAC	0V	-.7VDC	0V	50VDC	12VAC	60VDC
V 2	12SA7	0V	32VAC	85VDC	85VDC	5-9VDC	0V	18VAC	-.5VDC
V 3	6SS7	0V	39VAC	0V	-.7VDC	0V	85VDC	32VAC	85VDC
V 4	12SQ7	0V	-.7VDC	0V	-.9VDC	-.3VDC	57VDC	0V	12VAC
V 5	50L6GT	0V	87VAC	105VDC	85VDC	0V	0V	39VAC	5.6VDC
V 6	35Z5GT	0V	117VAC	113VAC	110VDC	110VAC	0V	87VAC	110VDC

‡TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SS7	0Ω	20Ω	0Ω	3.8 Meg	0Ω	†40KΩ	13Ω	†11KΩ
V 2	12SA7	0Ω	33Ω	†1000Ω	†1000Ω	22KΩ	1Ω	20Ω	4 Meg.
V 3	6SS7	0Ω	40Ω	0Ω	3.8 Meg	0Ω	†1000Ω	33Ω	†1000Ω
V 4	12SQ7	0Ω	15 Meg.	0Ω	3.8 Meg	65OKΩ	†470KΩ	0Ω	13Ω
V 5	50L6GT	Inf.	90Ω	†80Ω	†1000Ω	470KΩ	Inf.	40Ω	150Ω
V 6	35Z5GT	Inf.	120Ω	115Ω	7Ω	150Ω	Inf.	90Ω	55KΩ

†Measured From Pin 8 Of V6.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

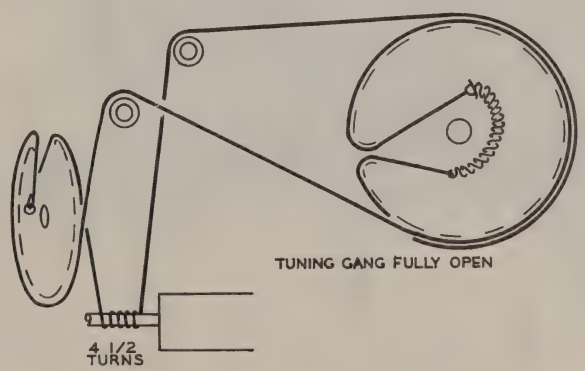
©Howard W. Sams & Co., Inc. 1949

4915-9

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

FIRESTONE MODEL 4-A-62

TRADE NAME	Firestone, Model 4-A-62, 4-A-63 (Codes 307-8-9039-A,-B)
SUPPLIER	The Firestone Tire and Rubber Co., Akron, Ohio
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna.
TUBES(EIGHT)	Types 6AG5 RF Amp., 12AT7 Converter, 6BA6 1st IF Amp., 6BA6 FM 2nd IF Amp., 6AL5 Ratio DET.-AVC, 6SQ7 AM DET-AVC-AF, 6V6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	105-125 Volts AC — RATING: .70 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1700KC — FREQ. MOD. 88-108MC



DIAL CORD DRIVE

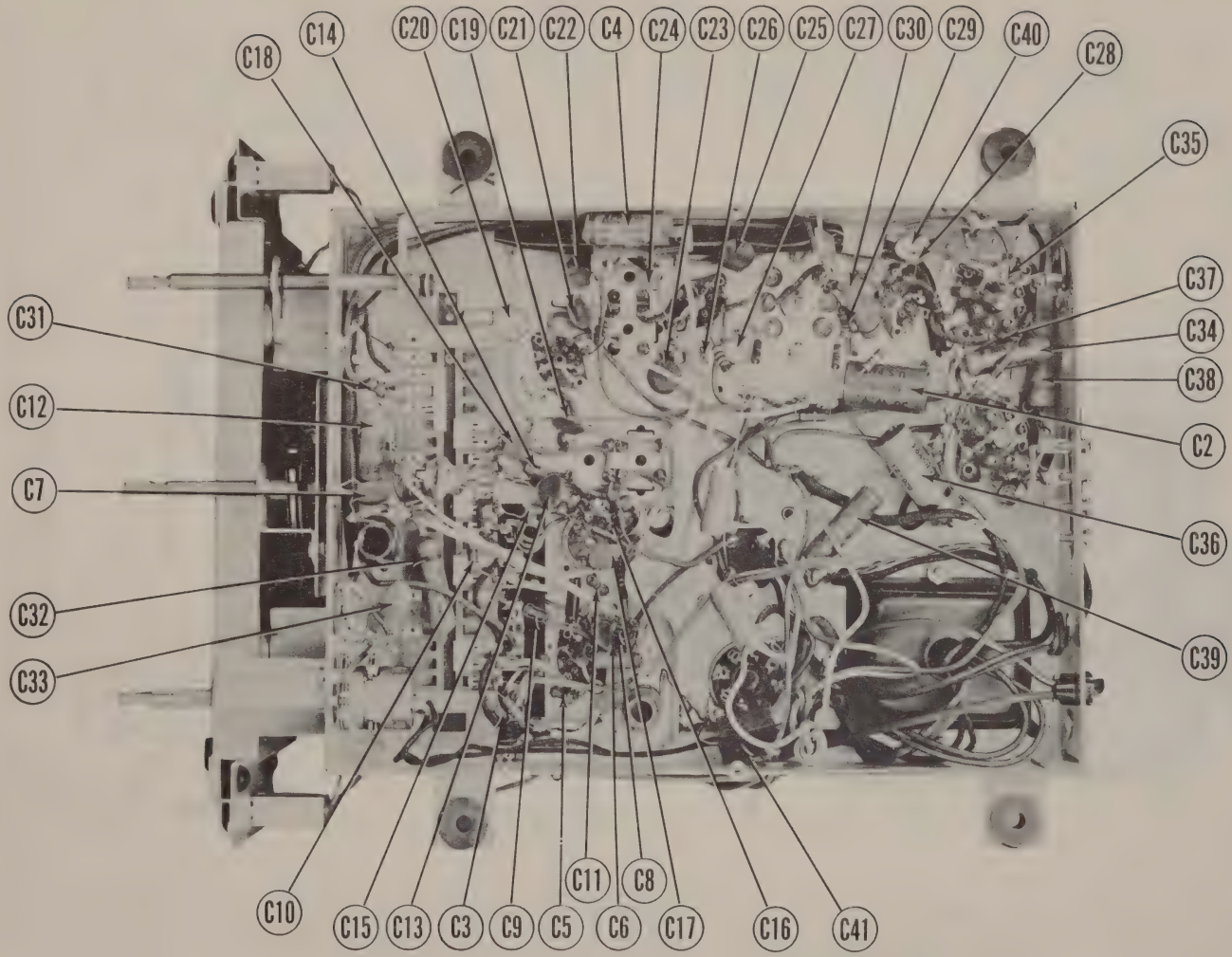
FIRESTONE MODELS
4-A-62, 4-A-63

FIRESTONE MODELS
4-A-62, 4-A-63

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 8/49 4915-10 SET #67 FOLDER #10


C18
C14
C20
C19
C21
C22
C4
C24
C23
C26
C25
C27
C30
C29
C40
C28
C35
C37
C34
C38
C2
C36
C39
C31
C12
C7
C32
C33
C10
C15
C13
C3
C9
C5
C11
C6
C8
C17
C16
C41

R21
R22
R23
R25
R24
R27
R28
R20
A
R18
R19
R17
C
A10
R16
R15
R10
R11
R12
A2
R13
R14
A15
R7
R6
M5
L7
R5
L8
R4
L6
R26
L9
R1
R9
L3
R8
R2
L4
L2
R3
A4
A13
R31
R30
R29
B

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Converter	12AT7	12AT7	9A	
V3	1st IF Amp.	6BA6	6BA6	7BK	
V4	FM 2nd IF Amp.	6BA6	6BA6	7BK	
V5	Ratio Det-AVC	6AL5	6AL5	6BT	
V6	DET-AVC-AF Amp.	6S47GT	6S97GT	8Q	
V7	Power Output	6V6GT	6V6GT	7AC	
V8	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FIRESTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	505908	AF862J4A	UP		DY-406	EL-424	▬Filter
B	30	450			43145C				■Filter
C	10	450							▲Filter
D	20	25							Output Cath. Bypass
C2	5	50	504937	PRS150/4	BR550		M-4-150	TVA-13	Stabilizing Cap
C3	22		504973	1468-000025	5W5Q2	GP1K-25	MO.5-425	MS-425	RF Coupling
C4	.05	200	512026	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C5	47		504974	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Cath. Bypass
C6	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Screen Bypass
C7	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Plate Decoupling
C8	47		504974	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Plate Decoupling
C9	5		504905	1468-000005	5W5V5	NP0K-5	MO.5-55	MS-55	RF Coupling
C10	1		504983	1468-000001					Osc. Coupling
C11	330		506341	1468-00035	5W5T4	GP2K-300	MO.5-33	1FM-335	Conv. Cath. Bypass
C12	.01	400	505873	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Conv. Cath. Byp. Note 2
C13	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Osc. Feedback
C14	10		506544	1468-00001	5W5Q1	GP1K-10	MO.5-41	MS-41	Voltage Divider
C15	39		504974	1468-00004	5W5Q4	GP1K-50	MO.5-44	1FM-44	Osc. Grid Cap Note 3
C16	10		513429	1469-00001	5R5Q1	NP0K-10	MOS.5-41	MS-41	Fixed Trimmer
C17	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Bypass
C18	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Decoupling
C19	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C20	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st IF Fil. Bypass
C21	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st IF Screen Bypass
C22	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st IF Plate Dec.
C23	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C24A	100		Note 1	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
B	100		Note 1	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C25	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Fil. Bypass
C26	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Screen Bypass
C27	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Plate Dec.
C28	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	DET-AF Fil. Bypass
C29	330		506341	1468-0003	5W5T3	GP2K-300	MO.5-33	1FM-335	Diode Load Cap
C30	.003	600	512004	P688-003	GT6D3	GP2M-003	ST-6-003	TM-23	De-emphasis
C31	100		506340	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Bypass
C32	.005	600	512006	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C33	.005	600	512006	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Tone Compensation
C34	.005	600	512006	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Tone Compensation
C35	.005	600	512006	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C36	.1	400	512034	P488-1	GT4P1		ST-4-1	TM-1	AF Plate Decoupling
C37	100		506340	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	AF Plate Bypass
C38	.02	400	512016	P488-02	GT4S2		ST-4-02	TM-12	Audio Coupling
C39	.005	600	512006	P688-005	GT6D5		ST-6-005	TM-25	Output Plate Bypass
C40	5000		505873	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Tone Compensation
C41	.01	600	512256	P688-01	GT6S1		MFH-6-01	TM-11	Line Filter

Note 1. Items C24A, C24B, and R12 are combined into one unit obtainable under Mfgr's Part No. 506338.
Note 2. Some Models use .005 MFD in this application.
Note 3. Some Models use 47 MMF in this application.

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD	V.C. IMP.		ST-119#		
SP1	PM	3.4Ω	506374	MOD.P10-T	10A31	#Replace Output Transformer to match 6-8Ω voice coil
	CONE DIA.	V.C. DIA.				
SP2	9-3/8"	1"				

R F COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: MEISSNER PART No.
L1	Loop Ant.	0Ω			
L2	AM Ant.Coil	.1Ω	2Ω	506357	
L3	FM Ant.Coil	0Ω			
L4	RF Plate Choke	1Ω		506337	
L5	FM RF Coil	0Ω		506351	
L6	AM RF Coil	90Ω	3Ω	506345	
L7	FM Osc.Coil	0Ω		506352	
L8	AM Osc.Coil	12Ω		506335	
L9	Filament Choke	0Ω		505075	
L10	FM 1st IF	.5Ω	.5Ω	506080	
L11	AM 1st IF	9.5Ω	9.5Ω	506333	16-6678
L12	FM 2nd IF	1.5Ω	.5Ω	505905	
L13	AM 2nd IF	12Ω	12Ω	505797	16-6678
L14	Ratio Det.	1Ω	0Ω	506332	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA:	NOTES
M1	Bayonet	6-8V	0.15A	Brown	118921		Type #47
M2	Bayonet	6-8V	0.15A	Brown	118921		Type #47
M3	Bayonet	6-8V	0.15A	Brown	118921		Type #47

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: ASTATIC PART No.	REMARKS
M4	505100	LT3-M	

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M5	Switch	506347	Band-Phono
M6	2 Gang Var. Cap.	506348	(30-528MMF, 16-187MMF)
	Dial Scale	506368	Glass
	Dial Pointer	506370	
	Cabinet	506376	Model 4-A-62
	Cabinet	506377	Model 4-A-63
	Knob	506381	Volume
	Knob	506382	Tone
	Knob	506183	Tuning
	Knob	506384	Band-Phono Switch

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	
R1A B	2 Meg. 2 Meg.	½ ½	505911			Volume control and SW tapped @ 500KΩ Tone control (Dual Concentric)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	FIRESTONE PART No.	IRC PART No.	
R2	82Ω	½	510017	BW-½-82	RF Cathode
R3	33KΩ	½	510164	BTS-33K	RF Screen
R4	1000Ω	½	510137	BTS-1000	RF Plate Decoupling
R5	1.8KΩ	½	510041	BTS-1800	Mixer Cathode
R6	10KΩ	½	510055	BTS-10K	Osc. Grid
R7	1000Ω	½	510137	BTS-1000	Osc. Plate
R8	1000Ω	½	510137	BTS-1000	Mixer Plate Decoupling
R9	47KΩ	½	510067	BTS-47K	AVC Network
R10	2.2 Meg.	½	510093	BTS-2.2 Meg.	AVC Network
R11	470KΩ	½	510085	BTS-470K	Diode Load
R12	47KΩ	½	See Note 1	BTS-47K	Diode Filter
R13	39KΩ	½	510165	BTS-39K	1st IF Screen
R14	1000Ω	½	510137	BTS-1000	1st IF Plate Decoupling
R15	39KΩ	½	510165	BTS-39K	2nd IF Screen
R16	1000Ω	½	510137	BTS-1000	2nd IF Plate Decoupling
R17	18KΩ	½	510059	BTS-18K	De-emphasis
R18	8.2KΩ	½	510053	BTS-8200	Ratio Det. Diode Load
R19	8.2KΩ	½	510053	BTS-8200	Ratio Det. Diode Load
R20	15 Meg.	½	510098	BTS-15 Meg.	AF Grid
R21	2.2 Meg.	½	510093	BTS-2.2 Meg.	AF Plate
R22	220KΩ	½	510079	BTS-220K	AF Plate
R23	470KΩ	½	510085	BTS-470K	Output Grid
R24	330Ω	½	510128	BW-½-330	Output Cathode
R25	47Ω	½	510013		Parasitic Suppressor
R26	68KΩ	½	510070	BTS-68K	Tone Compensation
R27	220KΩ	½	510079	BTS-220K	Phono Tone Compensation
R28	68KΩ	½	510070	BTS-68K	Phono Tone Compensation
R29	2.2 Meg.	½	510093	BTS-2.2 Meg.	AVC Network
R30	600Ω	5	510709	AB-600	Filter
R31	600Ω	5	510709	AB-600	Filter

Note 1. Items R12, C24A and C24B are combined into one unit obtainable under Mfgr's Part No. 506338.

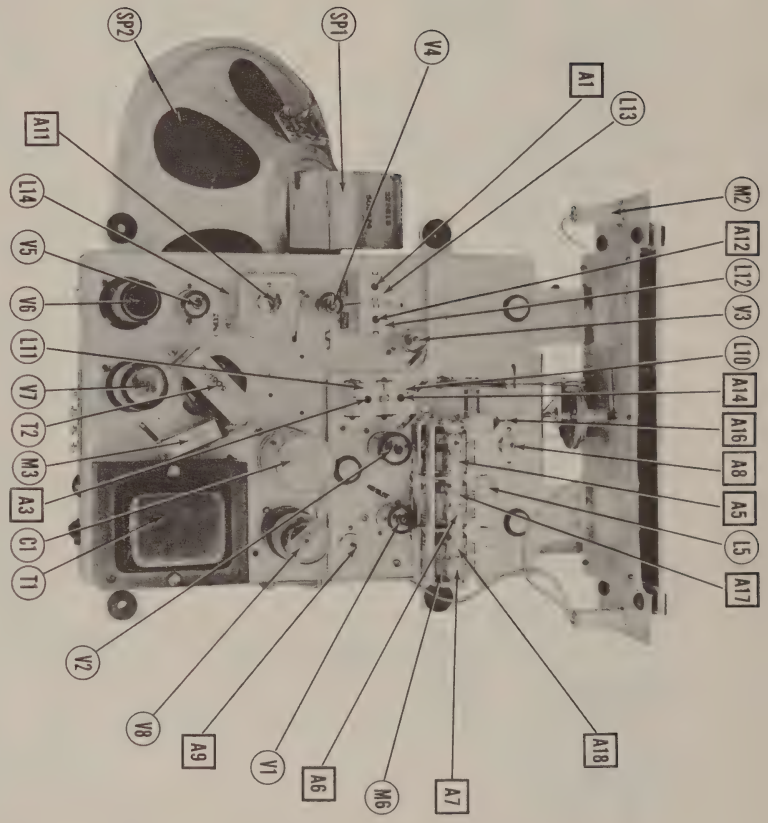
TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	FIRESTONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ .70A	630VCT .093A DC	5VAC @ 2A	6.3VAC @ 2.6A	506709	P-6012§	PH-90§	P-2952§

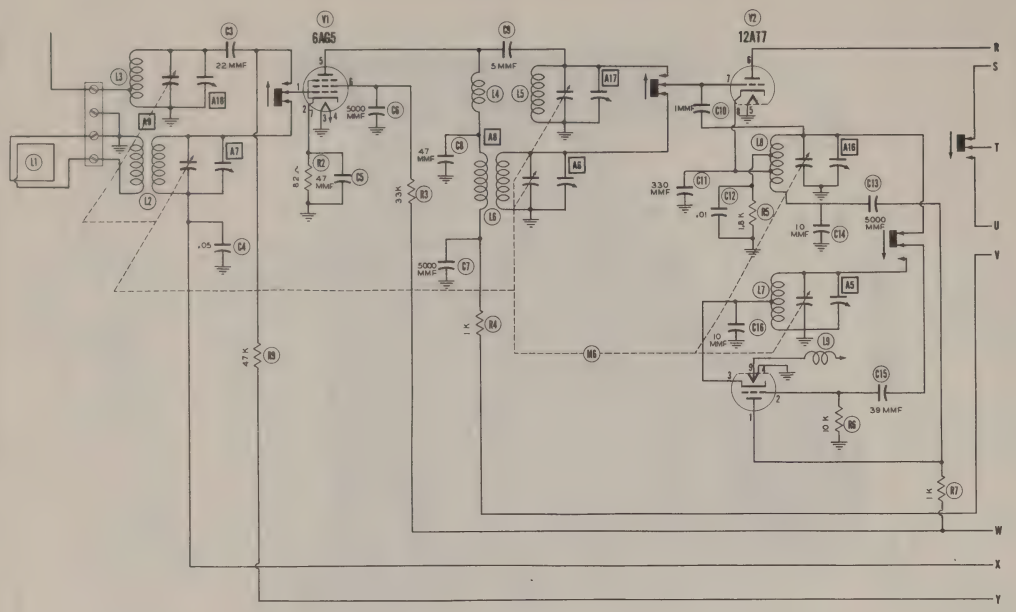
§Drill new mounting holes and add series resistor to reduce plate voltage.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		FIRESTONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	5900Ω	3.4Ω	480Ω	.4Ω	505912	A-3823	RO-303	A-2901	

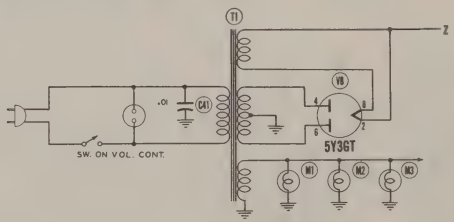


DATE 8/49 4915-10 SET #67 FOLDER #10



IF=455 KC AM

IF=10.7 MC FM



VOLTAGE READINGS

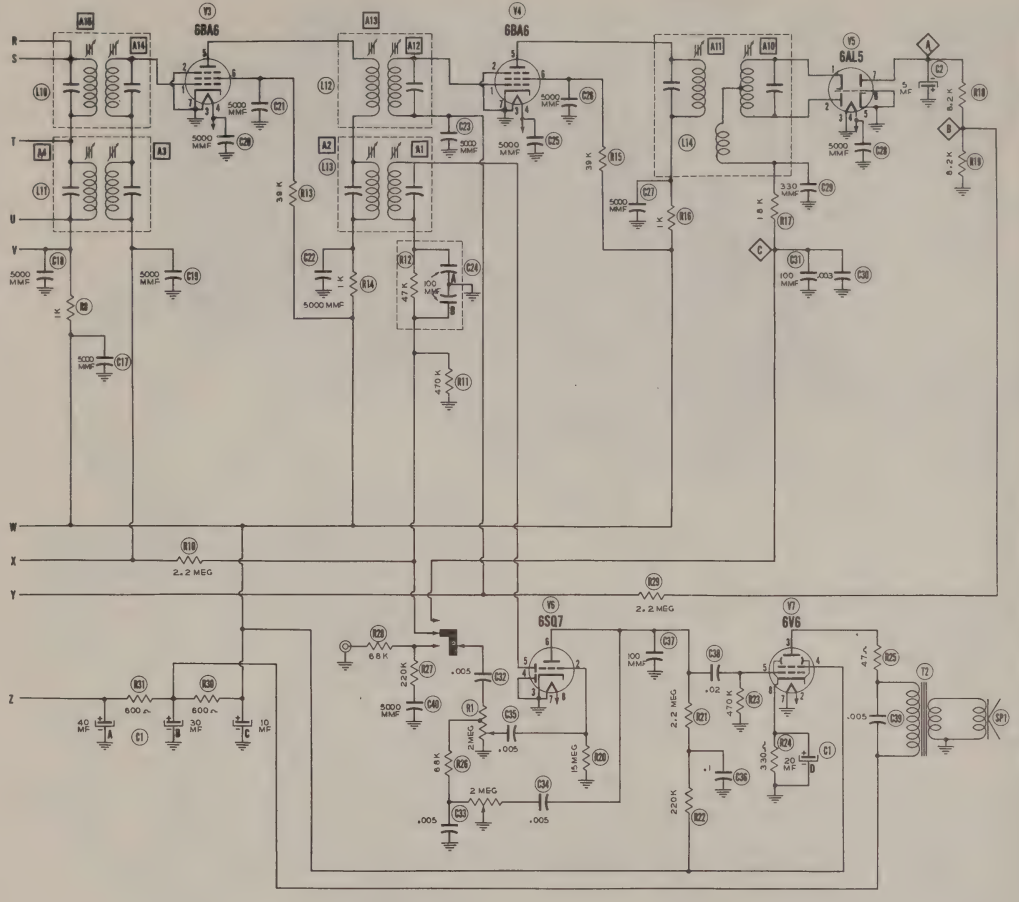
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AG5	-.6VDC	.6VDC	0V	6.5VAC	220VDC	190VDC	.6VDC		
V2A	12AT7	225VDC	1-15VDC	0V	0V	0V	225VDC	0V	5VDC	6.5VAC
+V2B	12AT7	225VDC	1-2.6VDC	0V	0V	0V	225VDC	0V	6.4VDC	6.5VAC
V3	6BA6	-.6VDC	0V	0V	6.5VAC	225VDC	95VDC	0V		
+V4	6BA6	-.4VDC	0V	0V	6.5VAC	225VDC	92VDC	0V		
+V5	6AL5	-1.2VDC	-.1VDC	0V	6.5VAC	0V	0V	-.3VDC		
V6	6BK7	0V	-.4VDC	0V	0V	-.3VDC	42VDC	0V	6.5VAC	
V7	6V6GT	0V	6.5VAC	240VDC	235VDC	0V	0V	0V	10VDC	
V8	5Y3GT	0V	320VDC	0V	320VAC	0V	320VAC	0V	320VDC	

‡TAKEN WITH VACUUM TUBE VOLTMETER.

+ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1949



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AQ5	3.3 Meg	85Ω	0Ω	.2Ω	*3KΩ	*30KΩ	85Ω		
V2A	12AT7	*2KΩ	10KΩ	0Ω	0Ω	0Ω	*2KΩ	3.5Ω	1.8KΩ	.2Ω
#V2B	12AT7	*2KΩ	10KΩ	0Ω	0Ω	0Ω	*2KΩ	0Ω	1.8KΩ	.2Ω
V3	6BA6	3.3 Meg	0Ω	0Ω	.2Ω	*2KΩ	40KΩ	0Ω		
V 3	6BA6	2.5 Meg	0Ω	0Ω	.2Ω	*2.5KΩ	*42KΩ	0Ω		
#V5	6AL5	Inf.	Inf.	0Ω	.2Ω	0Ω	Inf.	16KΩ		
V6	6SQ7	0Ω	15 Meg.	0Ω	0Ω	600KΩ	*2.5 Meg	0Ω	.2Ω	
V7	6V6GT	0Ω	.2Ω	*1200Ω	*1200Ω	470KΩ	Inf.	0Ω	330Ω	
V8	5Y3GT	Inf.	280KΩ	Inf.	110Ω	Inf.	110Ω	Inf.	280KΩ	

*Measured From Pin 2 Of V8.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1949

AM ALIGNMENT

To set pointer turn tuning cap fully closed and set pointer to last reference mark at low frequency end of dial.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

Do not use extension leads for connecting the loop; place the chassis near the cabinet so the loop connections can be made direct.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to center AM stator on tuning gang. Low side to chassis.	455KC	AM (center position)	Point of non-interference	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. Repeat adjustments to assure accurate alignment.
2.	260MMF	High side to ext. ant. clip. Low side to chassis.	1500KC	"	1500KC	"	A5	Adjust for maximum output.
3.	260MMF	"	1500KC	"	Tune for maximum signal.	"	A6,A7,	"
4.	260MMF	"	600KC	"	600KC	"	A8,A9	"

FM ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to center FM stator on tuning gang. Low side to chassis.	10.7MC	FM (Fully counter clockwise.)	Point of non-interference	DC Probe to Point (A) Common to chassis.	A11, A12, A13, A14, A15	Adjust for maximum deflection.
6.	.01MFD	"	"	"	"	DC Probe to Point (B) Common to Point (C)	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Recheck the adjustment of A11 and then A10 to assure accurate alignment of the discriminator transformer.
7.	300Ω carbon res.	High side thru 300Ω resistor to end terminal marked "FM". Low side to "GND" terminal.	106MC	FM	106MC	DC Probe to Point (A) Common to chassis.	A16	Adjust for maximum deflection. Two peaks may be obtained-use the peak at the low capacity end of the trimmer's range.
8.	300Ω carbon res.	"	106MC	"	Tune for maximum signal.	"	A17, A18	Adjust for maximum deflection.
9.	300Ω carbon res.	"	"	"	"	"	A14, A15	Recheck adjustment of A14 and A15 for maximum deflection.
10.	Check calibration at 90MC and 98MC. If calibration error is over 300KC, expand or compress the FM RF and Osc. coils as may be necessary and repeat steps 7 and 8 until receiver tracks and calibrates properly.							

FM ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to center FM stator on tuning gang. Low side to chassis.	10.7MC (400∿ Mod.)	FM	Point of non-interference		A11, A12, A13, A14, A15	Adjust for maximum sound from speaker. (These are course settings.)
6.	.01MFD	"	10.7MC (450KC Sweep)	"	"	Vert.Amp. to Point (C) Low Side to chassis.	A10	Adjust A10 so crossover point occurs at center of pattern as per Fig 1 and portion of curve between "A" and "C" is straight as possible.
7.	.01MFD	"	"	"	"	"	A11, A12, A13, A14, A15	Adjust these trimmers for maximum amplitude of pattern and steepness of line between points "A" and "C" of Fig 1.
8.	300Ω carbon res.	High side thru 300Ω resistor to end terminal marked "FM". Low side to "GND" terminal.	106MC (450KC Sweep)	"	106MC	"	A16	Adjust A16 so crossover point "B" of Fig 1 occurs at the center of the pattern. Two peaks may be obtained-use the peak at the low capacity end of the trimmer's range.
9.	300Ω carbon res.	"	"	"	Tune for max. signal.	"	A17, A18	Adjust for maximum amplitude.
10.	300Ω carbon res.	"	"	"	"	"	A14, A15	"
11.	Check calibration at 90MC and 98MC. If calibration error is over 300KC, expand or compress the FM RF and Oscillator coils as may be necessary, and repeat steps 8 and 9 until receiver tracks and calibrates properly.							

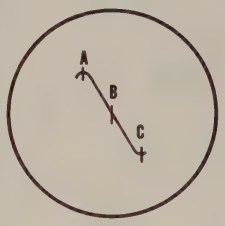


FIG. 1

Pattern obtained when frequency of the scope horizontal deflection voltage equals modulation frequency of signal generator.

OR

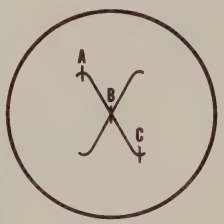
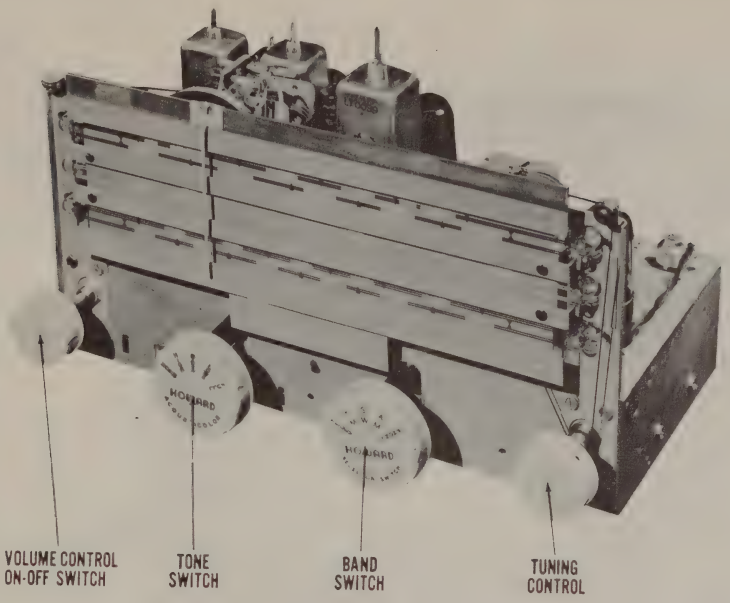


FIG.1

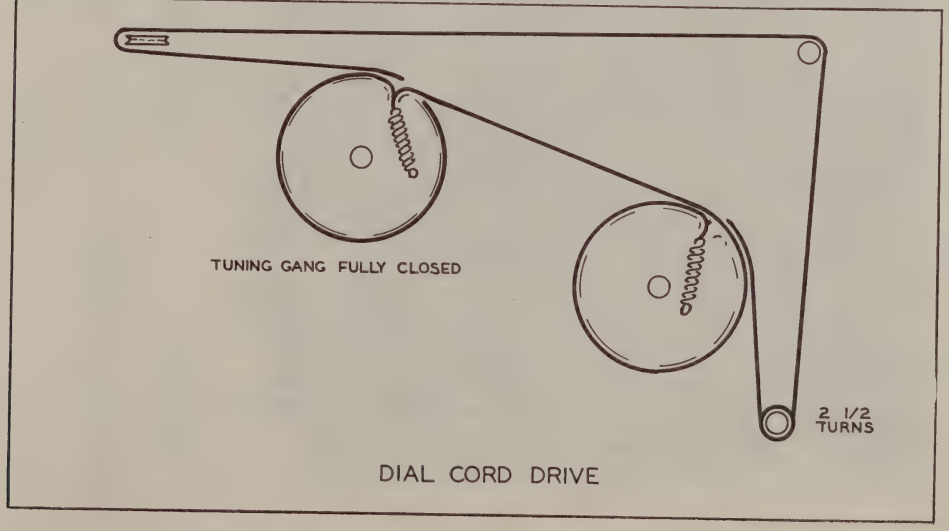
Pattern obtained when frequency of the scope horizontal deflection voltage is twice the modulation frequency of the signal generator.

HOWARD MODELS
481B, 481C, 481M



HOWARD MODELS
481B, 481C, 481M

TRADE NAME	Howard, Models 481B, 481C, 481M
MANUFACTURER	Howard Radio Co., 1735 Belmont Ave., Chicago 13, Illinois
TYPE SET	AC Operated Combination Phono-Radio, 2 Band AM-FM Superheterodyne with Loop Antenna.
TUBES(FOURTEEN)	Types 6BA6 FM RF Amp., 12AT7 FM Conv. 6BA6 FM 1st IF, 6BA6 FM 2nd IF, 6AL5 Ratio Det., 6SK7GT AM RF Amp., 6SA7GT AM Conv., 6SK7GT AM IF Amp., 6SQ7GT AM DET-AVC-AF, 6SQ7GT 2nd AF Amp., 6J5GT Phase Inv., (2) 6V6GT Power Output, 5Z4 Rectifier.
POWER SUPPLY	110-120 Volts AC RATING: 1.04 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1650KC SHORT WAVE 9-12.5MC FREQ. MOD. 88-108MC

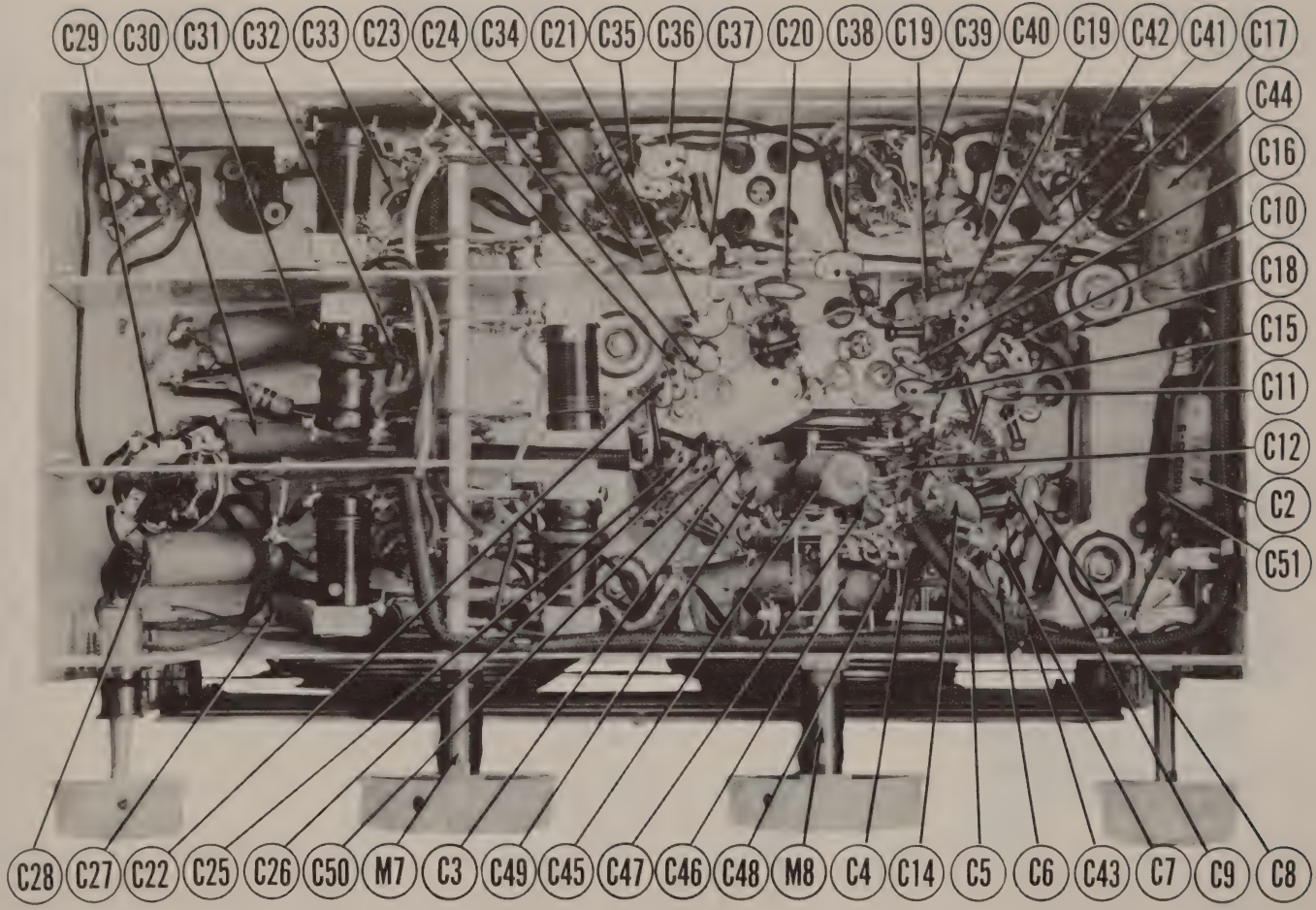


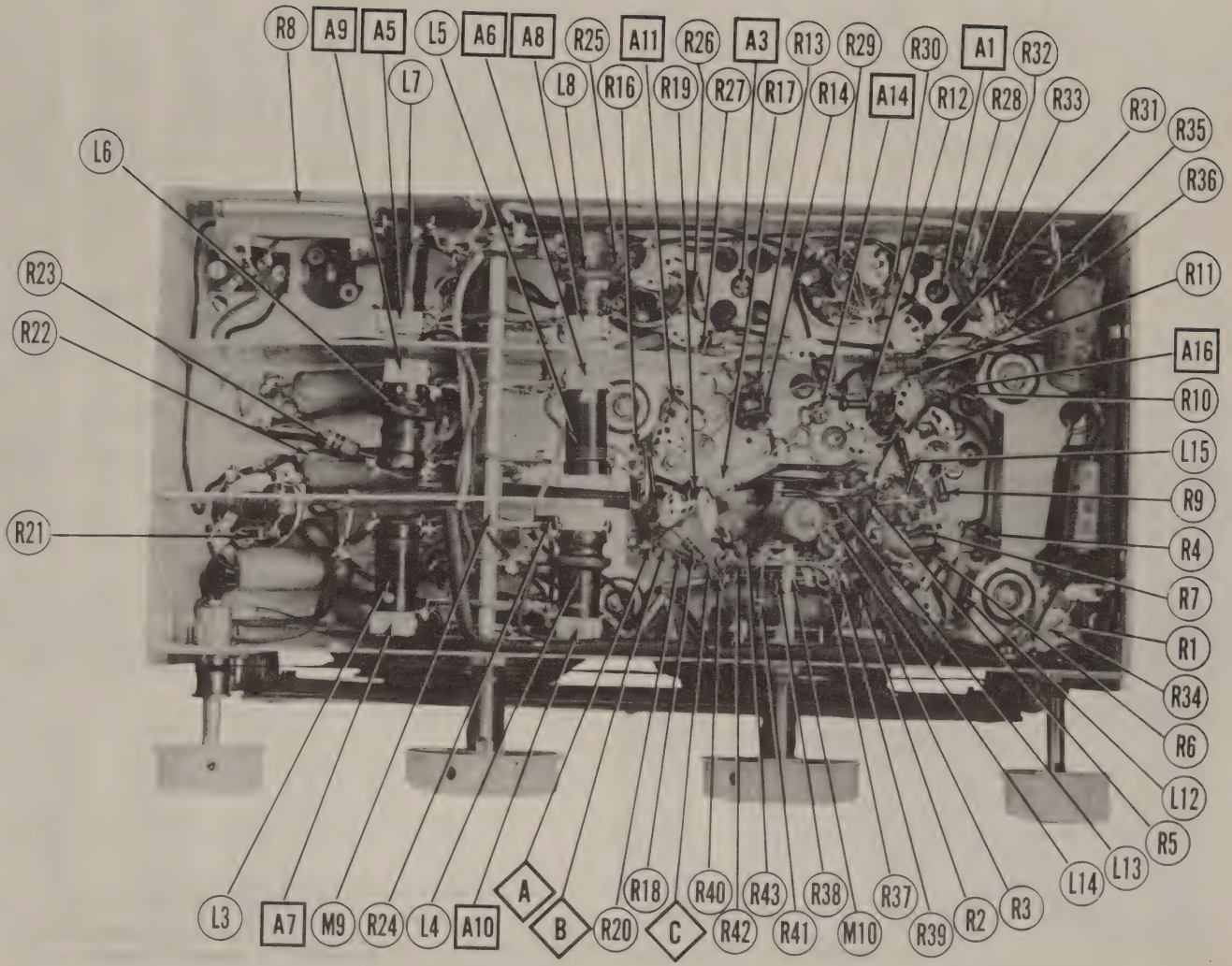
DIAL CORD DRIVE

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 8/49 4915-11 SET #67 FOLDER #11


C29
C30
C31
C32
C33
C23
C24
C34
C21
C35
C36
C37
C20
C38
C19
C39
C40
C19
C42
C41
C17
C44
C16
C10
C18
C15
C11
C12
C2
C51
C28
C27
C22
C25
C26
C50
M7
C3
C49
C45
C47
C46
C48
M8
C4
C14
C5
C6
C43
C7
C9
C8


R8
A9
A5
L5
A6
A8
R25
A11
R26
A3
R13
R29
R30
A1
R32
L7
L8
R16
R19
R27
R17
R14
A14
R12
R28
R33
R31
R35
L6
R36
R23
R11
R22
A16
R10
L15
R21
R9
R4
R7
R1
R34
R6
L12
R5
L13
L14
R18
R40
R43
R38
R37
L3
A7
M9
R24
L4
A10
A
B
R20
C
R42
R41
M10
R39
R2
R3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HOWARD PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	FM RF Amp.	6BA6	6BA6	7BK	
V2	FM Conv.	12AT7	12AT7		
V3	FM 1st IF	6BA6	6BA6	7BK	
V4	FM 2nd IF	6BA6	6BA6	7BK	
V5	Ratio Det.	6AL5	6AL5	6BT	
V6	AM RF Amp.	6SK7GT	6SK7GT	8N	
V7	AM Conv.	6SA7GT	6SA7GT	8AD	
V8	AM IF Amp.	6SK7GT	6SK7GT	8N	
V9	DET-AVC-1st AF	6SQ7GT	6SQ7GT	8Q	
V10	2nd AF Amp.	6SQ7GT	6SQ7GT	8Q	
V11	Phase Inverter	6J5GT	6J5GT	6Q	
V12	Power Output	6V6GT	6V6GT	7AC	
V13	Power Output	6V6GT	6V6GT	7AC	
V14	Rectifier	5Z4	5Z4	5L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HOWARD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	20	450	CE-0006	AF444J	UP		DY-3x20	EL-420*	◓Filter
B	20	450			222450*		-450		■Filter
C	20	450							▲Filter
C2	25	25	CE-0005	PRS25/25	BR252A		M-25-25	TA-25	Bias Filter
C3	25	25	CE-0005	PRS25/25	BR252A		M-25-25	TA-25	Stabilizing Cap
C4	100		CC-0037	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C5	5000		CC-0034	1461-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C6	5000		CC-0034	1461-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM RF Cath. Bypass
C7	5000		CC-0034	1461-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM RF Screen Bypass
C8	70		CC-0050	1468-000075	5W5Q7	GP1K-75	MOS.5-47	1FM-475	RF Coupling
C9	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM Conv. Cath. Bypass
C10	30		CC-0039		5R5Q3		MOS.5-43	MS-43	Fixed Trimmer
C11	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM Conv. Plate Decoup.
C12	100		CC-0037	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	FM Osc. Grid Cap
C13	5		CC-0051	1469-000005	5R5V5	NP0K-5	MOS.5-55	MS-55	Fixed Trimmer
C14	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM Osc. Plate Bypass
C15	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM Conv. Fil. Bypass
C16	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM Conv. Fil. Bypass
C17	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C18	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C19	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st IF Decoupling
C20	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Cath. Bypass
C21	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Decoupling
C22	100		CC-0016	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Load Cap Note 1
C23	100		CC-0016	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Load Cap Note 1
C24	300		CC-0028	1468-0003	5W5T3	GP2K-300	MO.5-33	MS-33	RF Bypass
C25	300		CC-0028	1468-0003	5W5T3	GP2K-300	MO.5-33	MS-33	De-emphasis
C26	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C27	.02	400	CP-0009	P488-02	GT4S2		ST-4-02	TM-12	AVC Filter
C28	.05	400	CP-0018	P488-05	GT4S5		ST-4-05	TM-15	AM RF Cath. Bypass
C29	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AM RF Screen Bypass
C30	.1	600	CP-0013	P688-1	GT6P1		ST-6-1	TM-1	AM RF Decoupling
C31	.1	600	CP-0008	P688-1	GT6P1		ST-6-1	TM-1	AVC Filter
C32	5		CC-0017	1469-000005	5R5V5	NP0K-5	MOS.5-55	MS-55	RF Coupling
C33	5		CC-0017	1469-000005	5R5V5	NP0K-5	MOS.5-55	MS-55	Fixed Trimmer
C34	50	500	CC-0014	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	AM Osc. Grid Cap
C35	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AM Osc. Anode Bypass
C36	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AM Osc. Anode * Note 2
C37	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AM Conv. Decoupling
C38	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C39	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st IF Screen Bypass
C40	5000		CC-0034	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	1st IF Decoupling
C41	100	500	CM-0018	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C42	100	500	CM-0018	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C43	.006	600	CP-0017	P688-006	GT6D6	GP2-335 -0075	ST-6-006	TM-26	Audio Coupling
C44	.1	600	CP-0013	P688-1	GT6P1		ST-6-1	TM-1	AF Plate Decoupling
C45	.05	600	CP-0007	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C46	.02	600	CP-0014	P688-02	GT6S2		ST-6-02	TM-12	Tone Compensation

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HOWARD PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R42	15KΩ	½		BTS-15K	Tone Compensation
R43	47KΩ	½		BTS-47K	Tone Compensation
R44	1 Meg.	½		BTS-1 Meg.	2nd AF Grid
R45	1800Ω	½		BTS-1800	2nd AF Cathode
R46	220KΩ	½		BTS-220K	2nd AF Plate
R47	22KΩ	½		BTS-22K	Feedback
R48	1800Ω	½		BTS-1800	Phase Inverter Cathode
R49	100KΩ	½		BTS-100K	Phase Inverter Plate
R50	220KΩ	½		BTS-220K	Phase Inverter Grid
R51	220KΩ	½		BTS-220K	Output Grid
R52	220KΩ	½		BTS-220K	Output Grid
R53	200Ω	2		BW-2-220	Output Cathode
R54	8.2Ω	½		BW-½-8.2	Bias Network
R55	47KΩ	½		BTS-47K	Bias Network
R56	47KΩ	½		BTS-47K	Bias Network
R57	500Ω	10		AB-500	Voltage Dropping
R58	500Ω	10		AB-500	Filter

Note 1. Not Used In All Models.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: HOWARD PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.
T1	117VAC @ 1.04A	780VCT @ .122A DC	5VAC @ 2A	6.5VAC @ 5.1A	TP-0004	P-6165	PH-120B‡	P-2955

‡Drill New Mounting Holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: HOWARD PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
T2	10.8KΩ CT	1.7Ω 3.5Ω 8.0Ω 500Ω	330Ω CT	.25Ω .3Ω .45Ω 24Ω	TO-0009			A-3027	

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ↺)	REPLACEMENT DATA: HOWARD PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
L1	.041A	420Ω	6H	LC-0009	C-1279	R-650	C-2981	

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: HOWARD PART No.	REPLACEMENT DATA: MEISSNER PART No.
L2	Loop Ant.	.5Ω		AN-0015	
L3	SW Ant.Coil	0Ω	0Ω	LA-0011	
L4	AM Ant. Loading Coil	2Ω		LA-0010	
L5	SW RF Coil	0Ω	.1Ω	LR-0006	
L6	AM RF Coil	1.5Ω	2Ω	LR-0005	
L7	SW Osc.Coil	.3Ω		LO-0019	
L8	AM Osc.Coil	3Ω		LO-0018	
L9	1st AM IF	18Ω	18Ω	LI-0016	
L10	2nd AM IF	18Ω	18Ω	LI-0017	
L11	FM Ant.Coil	0Ω		LA-0017	
L12	RF Plate Choke	1Ω		LC-0016	
L13	FM Osc.Coil	0Ω		LO-0028	
L14	FM RF Coil	0Ω		LR-0015	
L15	Fil.Choke	.5Ω		LC-0014	
L16	1st FM IF	.6Ω	.6Ω	LI-0037	
L17	2nd FM IF	.7Ω	.7Ω	LI-0038	
L18	Ratio Det.	.9Ω	0Ω	LI-0039	

PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA HOWARD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C47	.006	600	CP-0017	P688-006	GT6D6	GP2M-005	ST-6-006	TM-26	Tone Compensation
C48	.02	600	CP-0015	P688-02	GT6S2		ST-6-02	TM-12	Tone Compensation Note 3
C49	.002	600	CP-0016	P688-002	GT6D2	GP2M-002	ST-4-002	TM-22	Tone Compensation
C50	300		CM-0008	1468-0003	5WST3	GP2K-300	MO.5-33	1FM-335	Tone Compensation
C51	.05	600	CP-0002	P688-05	GT6S5		MPH-6-05	TM-15	Line Filter
C52	100	500	CM-0018	1468-0001	5WST1	GP1K-100	MO.5-31	1FM-31	AF Plate Bypass
C53	.0015	500	CP-0017	1467-0015	1WSD15	GP2L-0015	MW.5-215	1FM-215	Audio Coupling Note 4
C54	.02	600	CP-0014	P688-02	GT6S2		ST-6-02	TM-12	Audio Coupling
C55	.002	600	CP-0016	P688-002	GT6D2		ST-6-002	TM-22	Output Plate Bypass
C56	.1	600	CP-0008	P688-1	GT6P1		ST-6-1	TM-1	Bias Filter
C57	.15	400	CP-0011	P488-15	GT4P2		ST-4-2	TC-2	Bias Filter

*Omit Bypass Section.
†Omit One Section.
Note 1. When Either Item C22 Or C23 Are Replaced, Replace Both With Capacitors Of Equal Value.
Note 2. Not Used In All Models.
Note 3. Some Models Use .01MFD In This Application.
Note 4. Some Models Use .006MFD In This Application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA HOWARD PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	VC-0002	Q13-137	M-63-Z	Volume Control
B	Switch		Not Req.	76-1	SW-A	Attach To R1A Per Instructions

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA HOWARD PART No.	IRC PART No.	IDENTIFICATION CODES
R2	100KΩ	½		BTS-100K	FM RF Grid
R3	68Ω	½			FM RF Cathode
R4	1800Ω	½		BTS-1800	FM RF Screen
R5	10KΩ	½		BTS-10K	FM Osc. Grid
R6	1800Ω	½		BTS-1800	FM Osc. Plate
R7	1800Ω	½		BTS-1800	FM Conv. Cathode
R8	3500Ω	10		AB-3500	Voltage Dropping
R9	1800Ω	½		BTS-1800	FM Conv. Plate Decoupling
R10	100KΩ	½		BTS-100K	AVC Network
R11	68Ω	½			1st FM IF Cathode
R12	1800Ω	½		BTS-1800	1st FM IF Decoupling
R13	68Ω	½			2nd FM IF Cathode
R14	1800Ω	½		BTS-1800	2nd FM IF Decoupling
R15	220Ω	½			Balancing See Note 1
R16	22KΩ	½		BTS-22K	De-emphasis
R17	4.3Ω	½		BW-½-4.7	Ratio Det. Filament
R18	6800Ω	½		BTS-6800	Ratio Det. Load
R19	6800Ω	½		BTS-6800	Ratio Det. Load
R20	1 Meg.	½		BTS-1 Meg.	AVC Network
R21	220Ω	½		BW-½-220	AM RF Cathode
R22	68KΩ	½		BTS-68K	AM RF Screen
R23	1000Ω	½		BTS-1000	AM RF Decoupling
R24	47KΩ	½		BTS-47K	AVC Network
R25	22KΩ	½		BTS-22K	AM Osc. Grid
R26	22KΩ	1		BTA-22K	AM Osc. Anode
R27	1000Ω	½		BTS-1000	AM Conv. Decoupling
R28	1 Meg.	½		BTS-1 Meg.	AVC Network
R29	220Ω	½		BW-½-220	AM IF Cathode
R30	68KΩ	½		BTS-68K	AM IF Screen
R31	1000Ω	½		BTS-1000	AM IF Decoupling
R32	47KΩ	½		BTS-47K	Diode Filter
R33	270KΩ	½		BTS-270K	Diode Load
R34	47KΩ	½		BTS-47K	AF Grid
R35	180KΩ	½		BTS-180K	AF Plate
R36	47KΩ	½		BTS-47K	AF Plate Decoupling
R37	1 Meg.	½		BTS-1 Meg.	Tone Compensation
R38	18KΩ	½		BTS-18K	Tone Compensation
R39	1 Meg.	½		BTS-1 Meg.	Tone Compensation
R40	1 Meg.	½		BTS-1 Meg.	Tone Compensation
R41	47KΩ	½		BTS-47K	Tone Compensation

DATE 8/49 4915-11 SET #67 FOLDER #11

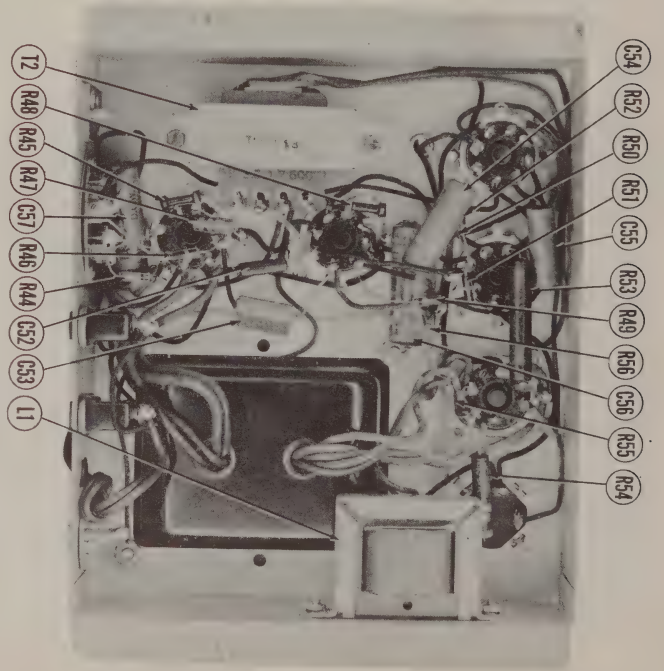
PARTS LIST AND DESCRIPTIONS (Continued)

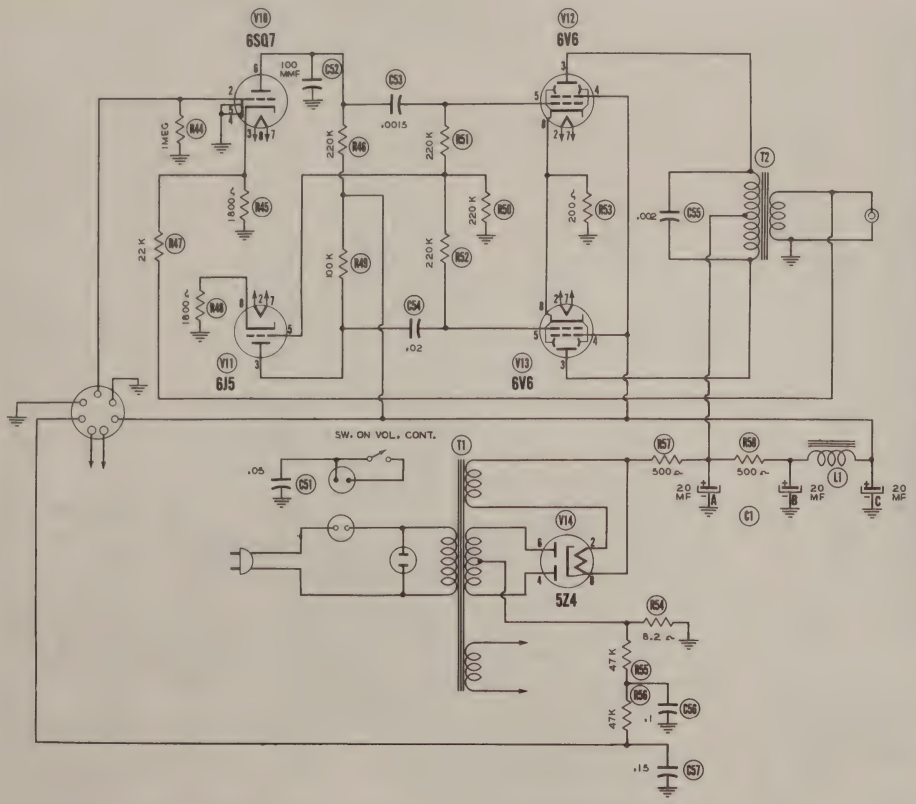
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA HOWARD PART No.		NOTES
M1 Thru M6	Bayonet	6-8V	0.25	Blue			Type #44
M7	Bayonet	6-8V	0.2A	White			Type #51
M8	Bayonet	6-8V	0.2A	White			Type #51

MISCELLANEOUS

ITEM No.	PART NAME	HOWARD PART No.	NOTES
M9	Switch	SW-0026	Band-Phono
M10	Switch	SW-0006	Tone
M11	AM Tuning Gang	CV-0012	(12-415MMF, 12-415MMF, 11-182MMF)
M12	FM Tuning Gang	CV-0018	(5-37MMF, 5-37MMF, 7-34MMF)
	Dial Scale	DG-0001	Broadcast
	Dial Scale	DG-0002	Short Wave
	Dial Scale	DG-0022	FM
	Cabinet	CW-0013	(State Mahogany Or Blond)





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡V1	6BA6	-.1VDC	0V	6.3VAC	0V	95VDC	95VDC	.9VDC		
‡V2	12AT7	110VDC	§-3.4VDC	0V	6VAC	6VAC	112VDC	0V	3VDC	0V
‡V3	6BA6	-.1VDC	0V	6.3VAC	0V	95VDC	95VDC	.9VDC		
‡V4	6BA6	0V	0V	6.3VAC	0V	95VDC	95VDC	.9VDC		
‡V5	6AL5	0V	0V	5VAC	0V	.2VDC	0V	-.3VDC		
V 6	6SK7GT	0V	0V	0V	-.1VDC	2.3VDC	100VDC	6.3VAC	280VDC	
V 7	6SA7GT	0V	6.3VAC	280VDC	100VDC	§-8.2VDC	0V	0V	-.1VDC	
V 8	6SK7GT	0V	0V	0V	-.2VDC	2.4VDC	108VDC	6.3VAC	280VDC	
V 9	6SQ7GT	0V	-.8VDC	0V	-.4VDC	-.4VDC	120VDC	6.3VAC	0V	
V 10	6SQ7GT	0V	0V	1.1VDC	0V	0V	125VDC	0V	6.3VAC	
V 11	6J5GT	0V	0V	95VDC	0V	.1VDC	0V	6.3VAC	2.4VDC	
V 12	6V6GT	0V	0V	310VDC	280VDC	.1VDC	340VDC	6.3VAC	17VDC	
V 13	6V6GT	0V	0V	310VDC	280VDC	.1VDC	.1VDC	6.3VAC	17VDC	
V 14	5Z4	0V	390VDC	0V	380VAC	-1VDC	380VAC	0V	390VDC	

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

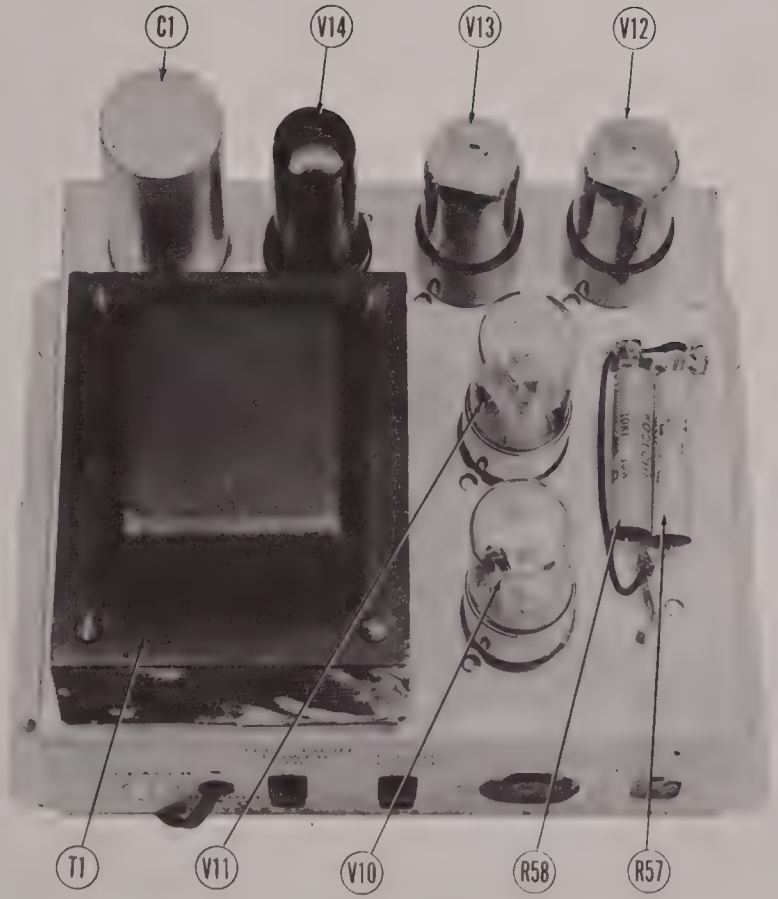
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡V1	6BA6	1 Meg.	0Ω	.2Ω	0Ω	*6.5KΩ	*6.5KΩ	68Ω		
‡V2	12AT7	*6.5KΩ	10KΩ	0Ω	.8Ω	.8Ω	*6.5KΩ	0Ω	2.2KΩ	0Ω
‡V3	6BA6	1 Meg.	0Ω	.2Ω	0Ω	*6.5KΩ	*6.5KΩ	68Ω		
‡V4	6BA6	.7Ω	0Ω	.2Ω	0Ω	*6.5KΩ	*6.5KΩ	68Ω		
‡V5	6AL5	Inf.	Inf.	2.2Ω	0Ω	6.8KΩ	0Ω	6.8KΩ		
V 6	6SK7GT	0Ω	0Ω	0Ω	1.2 Meg	220Ω	*75KΩ	.2Ω	*2.5KΩ	
V 7	6SA7GT	0Ω	.2Ω	*2.5KΩ	*24KΩ	22KΩ	.3Ω	0Ω	1.2 Meg.	
V 8	6SK7GT	0Ω	0Ω	0Ω	1.2 Meg	220Ω	*70KΩ	.2Ω	*2.5KΩ	
V 9	6SQ7GT	0Ω	1 Meg.	0Ω	300KΩ	300KΩ	*220KΩ	.2Ω	0Ω	
V 10	6SQ7GT	0Ω	45KΩ	1800Ω	0Ω	0Ω	*225KΩ	0V	.2Ω	
V 11	6J5GT	0Ω	0Ω	*100KΩ	450KΩ	220KΩ	.2Ω	.2Ω	1800Ω	
V 12	6V6GT	0Ω	0Ω	*650Ω	*1400Ω	440KΩ	250KΩ	.2Ω	200Ω	
V 13	6V6GT	0Ω	0Ω	*650Ω	*1400Ω	440KΩ	220KΩ	.2Ω	200Ω	
V 14	5Z4	0Ω	250KΩ	Inf.	80Ω	8Ω	80Ω	Inf.	250KΩ	

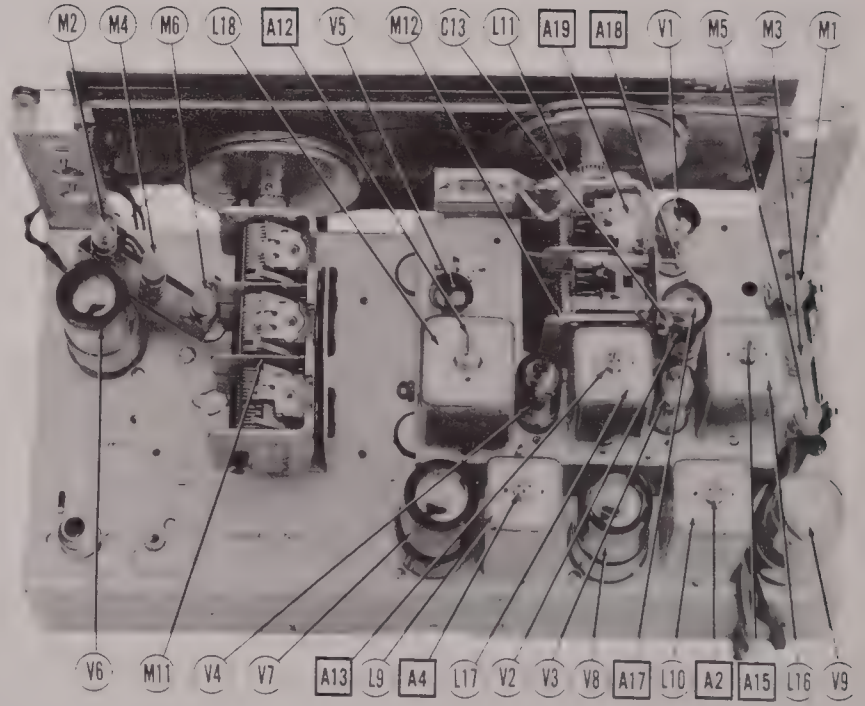
*Measured From Pin 8 Of V14.

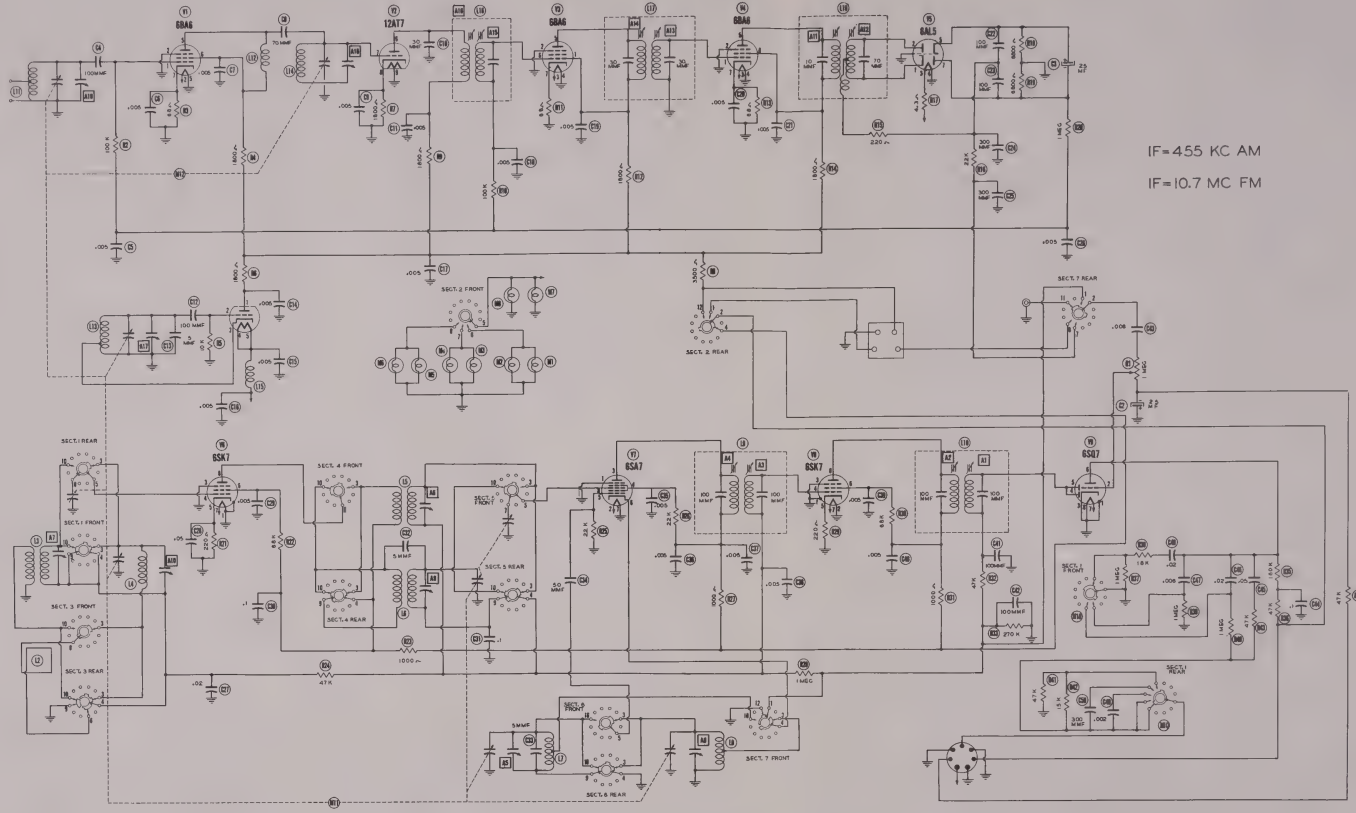
‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949


C1
V14
V13
V12
T1
V11
V10
R58
R57


M2
M4
M6
L18
A12
V5
M12
C13
L11
A19
A18
V1
M5
M3
M1
V6
M11
V4
V7
A13
L9
A4
L17
V2
V3
V8
A17
L10
A2
A15
L16
V9



1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

© Howard W. Sams & Co., Inc. 1949

AM ALIGNMENT

The RMA dummy used below consists of the following: a 200MMF capacitor in series with a 20 uh. choke which is shunted by a 400MMF capacitor in series with a 400Ω carbon resistor.

To set pointer turn tuning cap fully closed and set pointer to last reference mark at low frequency end of dial.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 8 (Grid) of 6SA7. Low to chassis.	455KC (Mod.)	BC	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4,	Adjust for maximum output.
2.		Loop	11.9MC	SW	11.9MC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	"	"	"	"	A6,A7	Rock tuning cap and adjust for maximum output. Check for IF image at 11MC.
4.	RMA Dummy	High side to pin 4 (Grid) of 6SK7 (V6). Low side to chassis.	1400KC	BC	1400KC	"	A8,A9	Adjust for maximum output.
5.		Loop	"	"	"	"	A10	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FIG. 1

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	.05MFD	High side to pin 1 (Grid) of 6BA6 (V4). Low side to chassis.	10.7MC (Unmod.)	FM	Tuning cap fully closed	DC Probe to Point ⓑ Common to chassis.	A11	Turn A11 to extreme counterclockwise position and then turn clockwise to first peak and adjust for maximum. Attenuate sig. gen. to give a -2 volt reading.
7.	.05MFD	"	"	"	"	DC Probe to Point ⓒ Common to chassis.	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Repeat steps 6 and 7.
8.	.05MFD	High side to pin 7 (Grid) of 12AT7 (V2). Low side to chassis.	"	"	"	DC Probe to Point ⓐ Common to chassis.	A13, A14, A15, A16	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

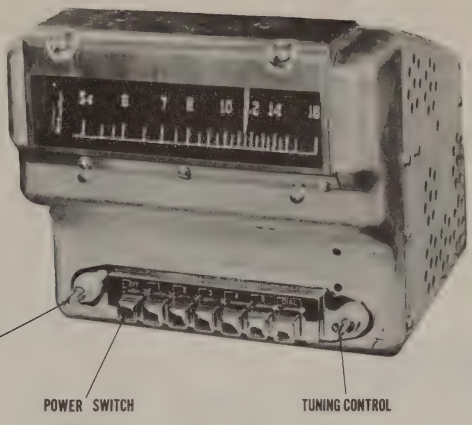
Use frequency modulated signal with 60\ modulation and 450KC sweep. Use 120\ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	.05MFD	High side to pin 1 (Grid) of 6BA6 (V3). Low side to chassis.	10.7MC (450KC Swesp)	FM	Tuning cap fully closed	Vert.Amp. to Point ⓒ Low Side to chassis.	A11, A12, A14	Disconnect stabilizer cap C5. Adjust A11, A13, and A14 for maximum amplitude and symmetry as per Fig 1.
7.	.05MFD	High side to pin 7 (Grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A15, A16	"
8.	.05MFD	"	"	"	"	Vert.Amp. to Point ⓐ Low Side to chassis.	A12	Reconnect stabilizer cap C3. Adjust A12 so cross-over point occurs at center as per Fig 2. Retouch A11 for maximum amplitude and straightness of cross over lines.

FIG. 2

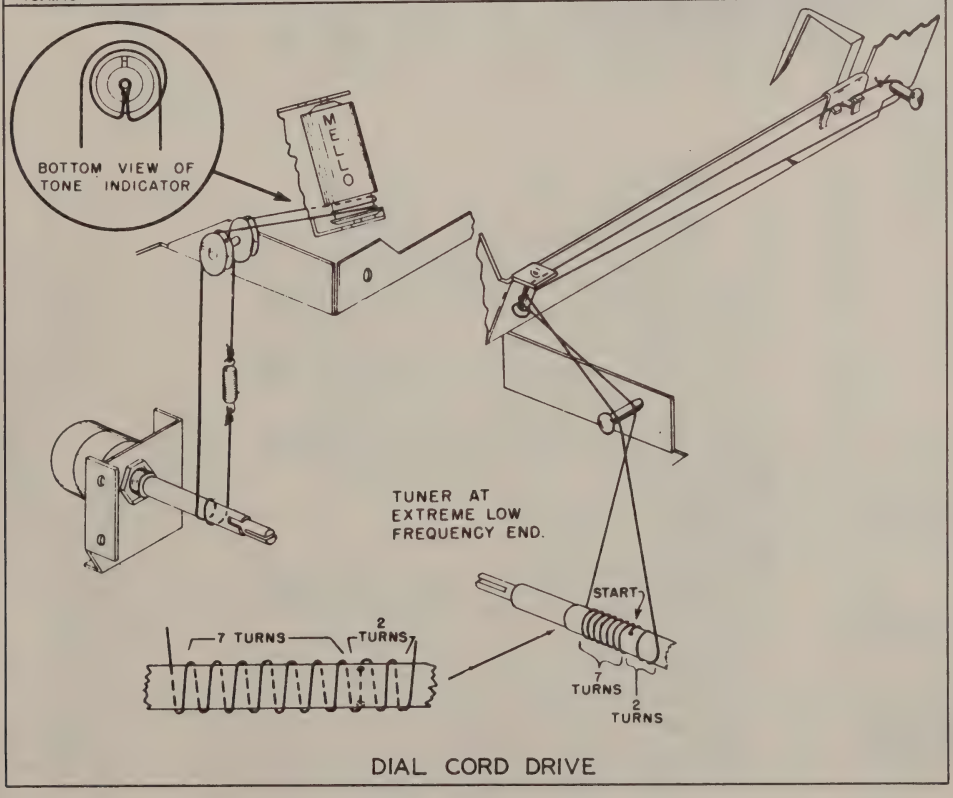
FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	300Ω carbon res.	High side thru 300Ω to ungrounded FM antenna terminal. Low side to chassis.	105MC	FM	105MC	DC Probe to Point ⓑ Common to chassis.	A17	Detune A18 by turning to the left-almost open. Adjust A17 for maximum deflection.
10.	"	"	"	"	"	"	A18, A19	Adjust for maximum deflection. Check calibration at 90MC. If receiver does not calibrate correctly, expand or compress oscillator coil until calibration at 90MC is correct. Repeat steps 9 and 10 until calibration is correct across entire band.



MOPAR MODEL 804

TRADE NAME	Mopar, Model 804
SUPPLIER	Chrysler Corp., Detroit 31, Michigan.
TYPE SET	Battery Operated Custom Built Automotive Superheterodyne Receiver.
TUBES (EIGHT)	Types 6BA6 RF Amp., 6BE6 Converter, 6BA6 IF Amp., 6AT6 DET-AVC-AF, 6AT6 Phase Inverter. (2) 6V6GT Power Output, 6X4 Rectifier.
POWER SUPPLY	6 Volt Storage Battery RATING 9.4 Amp. @ 6 Volts DC
TUNING RANGE—BROADCAST	535-1605KC



DIAL CORD DRIVE

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

8/49 4915-12 SET #67 FOLDER #12

MOPAR MODEL 804
(MOTOROLA 804)

MOPAR MODEL 804
(MOTOROLA 804)

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOPAR-MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amp.	6BA6	6BA6	7BK	
V4	DET-AVC-AF	6AT6	6AT6	7BT	
V5	Phase Inverter	6AT6	6AT6	7BT	
V6	Power Output	6V6GT	6V6GT	7AC	
V7	Power Output	6V6GT	6V6GT	7AC	
V8	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

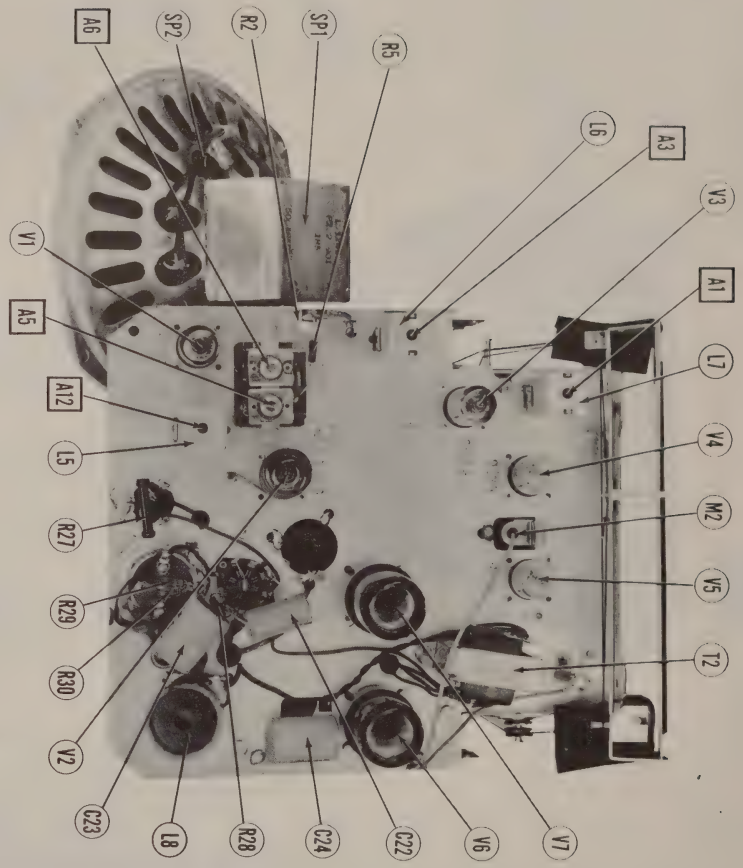
ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOPAR-MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	400	23A472570	AF44J*	UP2245*		DY-2x20-450*	EL-323§	■Filter
B	20	350		PRS450/10	BR1045		M-10-450		▲Filter
C2	100		21B77562	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Voltage Divider
C3	.006	100	8C4529	P488-006	GT6D6	GP2M-005	ST-6-006	TM-26	RF Coupling
C4	15		21K580179			GP1K-15		MS-415	Fixed Trimmer
C5	.05	100	8K13514	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C6	100			1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Cath. Bypass Note
C7	5		21K70720	1468-0000-05	5W5V5	NP0K-5	MO.5-55	MS-55	RF Coupling
C8	50		21K74661	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap
C9	.05	100	8K13514	P288-05	GT2S5		ST-4-05	TM-15	RF Bypass
C10	.1	200	8K485370	P288-1	GT2P1		ST-2-1	TM-1	Osc. Feedback
C11	115		21K580275						Fixed Trimmer
C12	.05	400	8K14791	P488-05	GT4S5		ST-4-05	TM-15	Decoupling
C13	.1	400	8K13166	P488-1	GT4P1		ST-4-1	TM-1	Decoupling
C14	50		21K74661	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	IF Coupling
C15	.006	100	8C4529	P488-006	GT6D6		ST-6-006	TM-26	Tone Compensation
C16	.05	100	8K13514	P288-05	GT2S5		ST-4-05	TM-15	Audio Coupling
C17	.006	400	8K71910	P488-006	GT6D6		ST-6-006	TM-26	Tone Compensation
C18	500	500	21R8638	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	AF Plate Bypass
C19	.03	400	8K71911	P488-03	GT4S3		ST-6-03	TM-13	Audio Coupling
C20	.03	400	8K71911	P488-03	GT4S3		ST-6-03	TM-13	Audio Coupling
C21	.003	1000	8K13165	P1088-003	GT16D3		STM-16-003	MB-23	Output Plate Bypass
C22	.006	1600	8K12840	P1688-006	GT16D6		STM-16-006	MB-26	Buffer
C23	.5	100	8C580845	P288-5	GT2P5		SHH-1	68P20	Hash Filter
C24	.5	100	8C580845	P288-5	GT2P5		SHH-1	68P20	Hash Filter
C25	.5	100	8C580845	P288-5	GT2P5		SHH-1	68P20	Hash Filter

*Parallel Sections To Obtain Desired Capacity.
§Omit Bypass Section.
Note. Not Used In All Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOPAR-MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	18A485319			Volume control (Dual Concentric)
B	500KΩ	½				Tone control
R2	700Ω	½	18K77552			Sensitivity control

CHASSIS—TOP VIEW



ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The dummy antenna used is a 40MMF capacitor in series with the high side of the signal generator and the antenna receptacle of the receiver. Connect another 40MMF capacitor from the antenna receptacle to chassis.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	DEPRESS PUSH BUTTON	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to Pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC	Dial	Tuning slugs fully out.	Across voice coil.	A1, A2 A3, A4	Adjust for maximum output.
2.	Dummy (See Above)	High side to antenna receptacle. Low side to chassis.	1605KC	"	" Cores should project 1-1/8" from cans.	"	A5, A6, A7	"
3.	Dummy (See Above)	"	1425KC	"	Set spacing between carriage plate and coil shield plate to 1-5/64".	"	A8, A9 A10	"
	Step 4 should not be made unless there has been a component change in the oscillator circuit.							
4.	Dummy (See Above)	High side to antenna receptacle. Low side to chassis.	OFF	Dial	Set spacing between carriage plate and coil shield plate to 7/32"	Across voice coil.	A11	Adjust for maximum noise If A11 must be moved more than 1/2 turn, repeat steps 2, 3, and 4 until A11 requires only 1/2 turn or less.
5.	Dummy (See Above)	"	455KC	Set PB#1 to 600KC		"	A12	Adjust for minimum output.
6.	Repeats steps 2 and 3, but eliminate procedure of moving cores to project 1-1/8" from cans.							
7.	Dummy (See Above)	High side to antenna receptacle. Low side to chassis.	1400KC	Set PB#5 to 1400KC		Across voice coil	A13	Adjust for maximum output.
	NOTE: The following pushbutton tracking nut adjustments have been made at the factory. Unless components have been changed in the pushbutton assembly circuit, these adjustments should not be made in the field.							
8.	Dummy (See Above)	High side to antenna receptacle. Low side to chassis.	1605KC	Set PB#5 to 1605KC		Across voice coil	A13	Adjust for maximum output.
9.	Dummy (See Above)	"	1425KC	Set PB#5 to 1425KC		"	A14	Adjust for maximum output Recheck adjustment of the pushbutton antenna trimmer A13 and repeat steps 8 and 9 if sensitivity rises with a change in the setting of A13.
10.	Dummy (See Above)	"	1020KC	Set PB#4 for 1020KC		"	A15	Adjust for maximum output.
11.	Dummy (See Above)	"	1020KC	Set PB#3 for 1020KC		"	A16	"
12.	Dummy (See Above)	"	1020KC	Set PB#2 for 1020KC		"	A17	"
13.	Dummy (See Above)	"	600KC	Set PB#1 for 600KC		"	A18	"
14.	Dummy (See Above)	"	1400KC	Dial	Tune for max. signal.	"		Set pointer at 1400KC
15.	Install receiver in car and fully extend the antenna.							
16.				Dial	Approx. 1400KC		A7	Tune in weak station near 1400KC and adjust for max. volume.
17.				Set PB#5 to approx. 1400KC			A13	"

PUSHBUTTON ADJUSTMENTS

1. Pull off the pushbutton knobs exposing the knurled knobs B1, B2, B3, B4 and B5.
2. Push "Dial" button and tune in a desired station within the range of pushbutton #1.
3. Push in PB#1 and turn B1 to the left or right and tune in station obtained in step 2.
4. Repeat the procedure for the remaining pushbuttons, keeping in mind to tune in stations only within the range of the individual pushbuttons. These ranges are listed below.

PB#1 - 535 to 1020KC PB#2 - 610 to 1200KC PB#3 - 700 to 1410KC

PB#4 - 740 to 1480KC PB#5 - 840 to 1600KC

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MOPAR-MOTOROLA PART No.	REPLACEMENT DATA MEISSNER PART No.
L1	Ant. Coil	11Ω		24B71881	
L2	RF Coil	11Ω		24B71881	
L3	Osc. Coil	2.8Ω		24B71879	
L4	Osc. Shunt	3Ω		24B485386	
L5	IF Trap	85Ω		24B580274	
L6	Input IF	17Ω	17Ω	24B485553	16-6668
L7	Output IF	17Ω	17Ω	24K485555	
L8	Hash Choke	0Ω		24A473954	

VIBRATOR

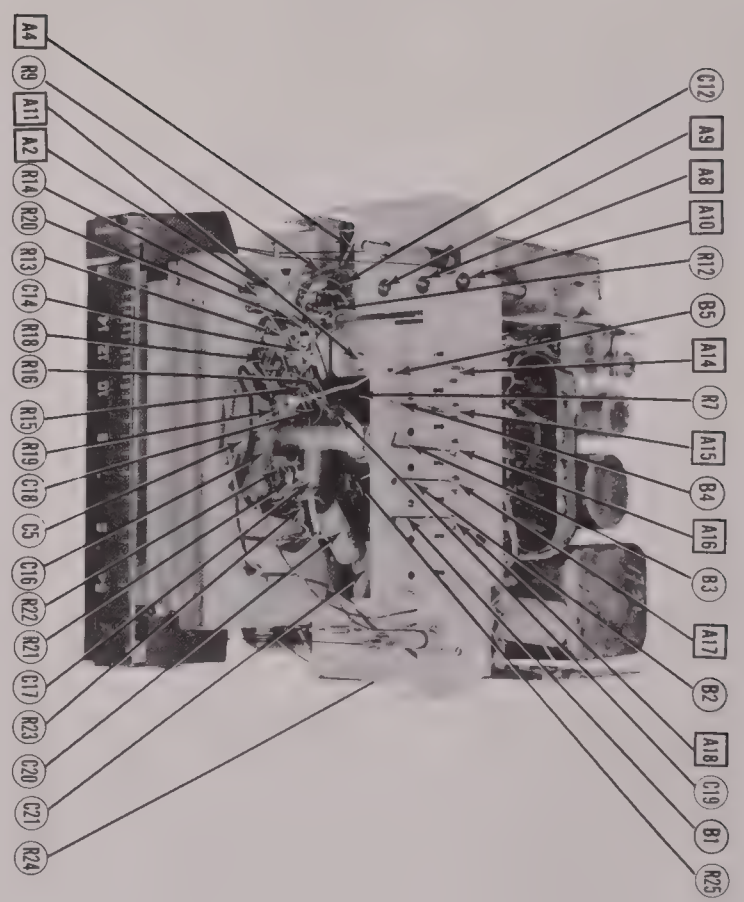
ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA MOPAR-MOTOROLA PART No.	REPLACEMENT DATA CORNELL-DUBILIER PART No.	REPLACEMENT DATA RADIART PART No.	INSTALLATION NOTES
M1	Int.	6V	115∿	48B3333	C42M	5342M	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA MOPAR-MOTOROLA PART No.		NOTES
M2	Bayonet	6-8V	0.25A	Blue	65X10867		Type #44
M3	Bayonet	6-8V	0.4A	White	65X12855		Type #55
M4	Bayonet	6-8V	0.4A	White	65X12855		Type #55

MISCELLANEOUS

ITEM No.	PART NAME	MOPAR-MOTOROLA PART No.	NOTES
M5	Spark Plate	1B580195	
M6	Fuse	65X12894	14 Amp.
M7	Tuning Assembly	1X489270	
A5	Dual Trimmer	20A580174	Osc. Adj.
A6	Dual Trimmer	20A580174	RF Adj.
A7	Trimmer	20K472613	Ant. Adj.
A13	Trimmer	20K472613	PB Adj.
	Dial Crystal	61K485208	
	Dial Pointer	1X580340	
	Knob	1X580252	Tuning/Volume
	Knob	36K580590	Tone



DATE 8/49 4915-12 SET #67 FOLDER #12

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MOPAR-MOTOROLA PART No.	IRC PART No.	
R3	470KΩ	½	6R6032	BTS-470K	RF Grid
R4	82Ω	½	6R2035	BW-½-82	RF Cathode
R5	150Ω	½	6R3992	BW-½-150	RF Cathode
R6	150KΩ	½		BTS-150K	RF Coupling
R7	12KΩ	1	6R5656	BTA-12K	RF Plate
R8	100KΩ	½	6R6075	BTS-100K	Conv. Grid
R9	330Ω	½	6R6022	BW-½-330	Conv. Decoupling
R10	10KΩ	1	6R6106	BTA-10K	Screen Dropping
R11	47KΩ	½	6R6056	BTS-47K	Osc. Grid
R12	220Ω	½	6R6270	BW-½-220	IF Cathode
R13	68KΩ	½	6R6001	BTS-68K	Voltage Divider
R14	47KΩ	½	6R6056	BTS-47K	Diode Filter
R15	1 Meg.	½	6R6004	BTS-1 Meg.	AVC Network
R16	1 Meg.	½	6R6004	BTS-1 Meg.	Diode Load
R17	22KΩ	½	6R6028	BTS-22K	Tone Compensation
R18	1500Ω	½	6R6161	BTS-1500	AF Cathode
R19	3.3 Meg.	½	6R2118	BTS-3.3 Meg.	AF Grid
R20	220KΩ	½	6R6015	BTS-220K	AF Plate
R21	10KΩ	½	6R6320	BTS-10K	Phase Inv. Grid
R22	2200Ω	½	6R6069	BTS-2200	Phase Inv. Cathode
R23	220KΩ	½	6R6015	BTS-220K	Phase Inv. Plate
R24	220KΩ	½	6R6407	BTS-220K	Output Grid
R25	220KΩ	½	6R6015	BTS-220K	Output Grid
R26	220Ω	1	6R6389	BW-1-220	Output Cathode
R27	2200Ω	1	6R6006	BW-1-2200	Filter
R28	10KΩ	½	6R6054	BTS-10K	Series Buffer
R29	56Ω	½	6R5614	BW-½-56	Hash Suppression
R30	56Ω	½	6R5614	BW-½-56	Hash Suppression
R31	470Ω	½		BTS-470	RF Cathode

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOPAR-MOTOROLA PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	6VDC @ 5.8A	580VCT .057A DC			24C580066	P-4062	VT-3	P-4071

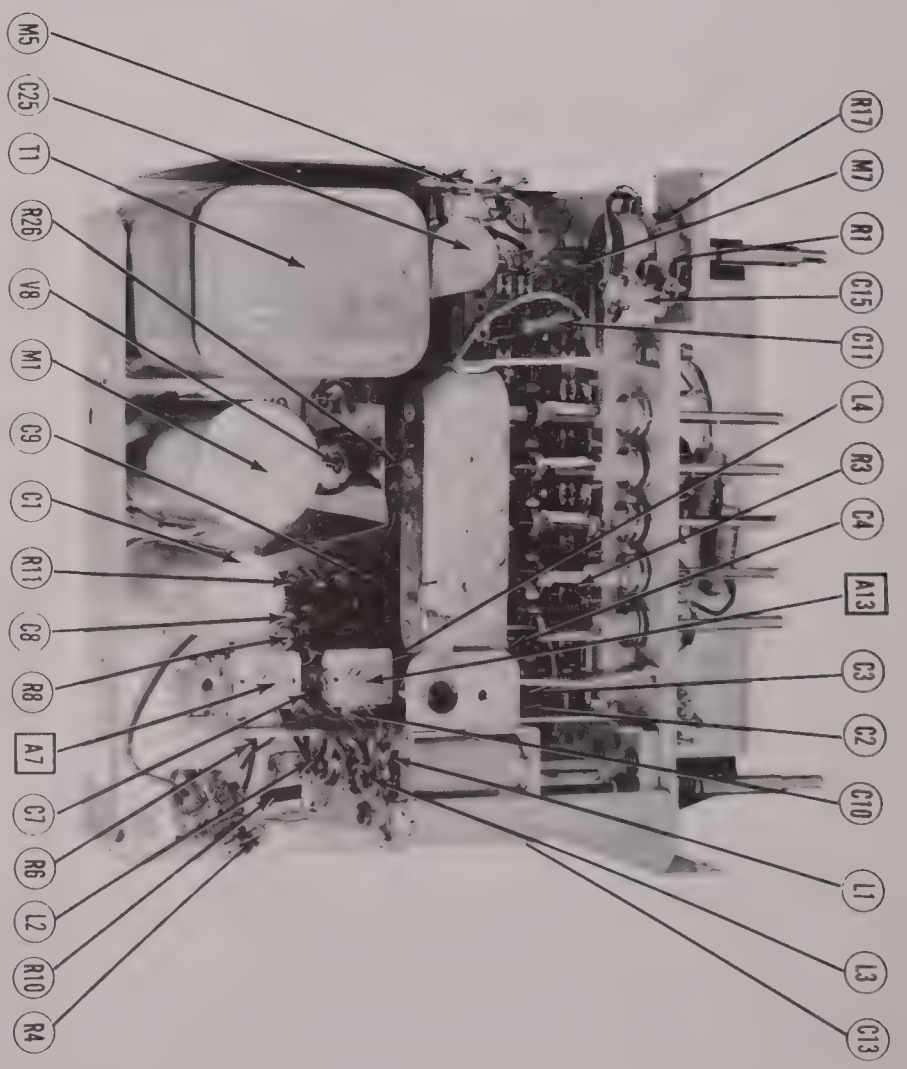
TRANSFORMER (OUTPUT)

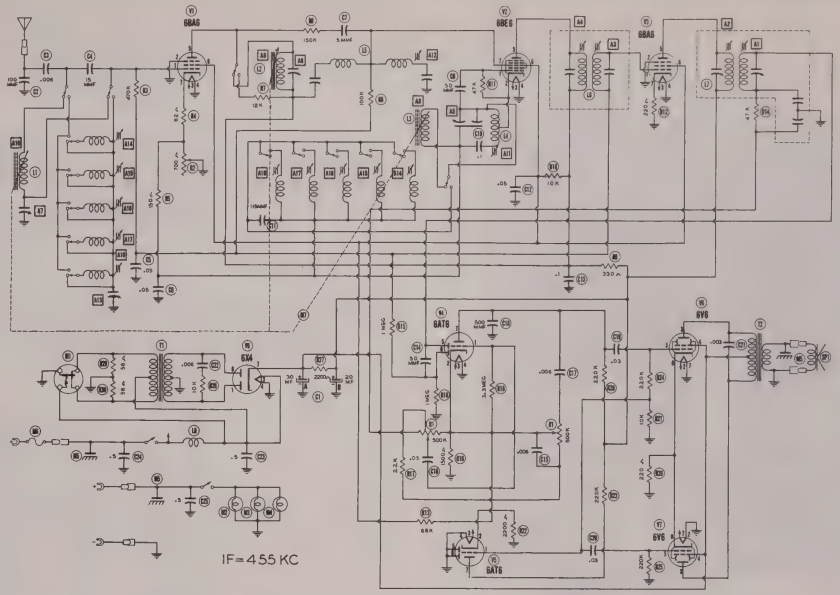
ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MOPAR-MOTOROLA PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	9800Ω CT	3.5Ω	375Ω CT	.26Ω	24B472558	A-3850	RO-110‡	A-2936‡	‡Drill One New Mounting Hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V.C. IMP.	MOPAR-MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
SP1A	PM	3.5Ω	50C485637	ST-807 MOD.P7-T	7A31	
B			50B580159			Alternate
C			50C580829			Alternate
	CONE DIA.	V.C. DIA.				
SP2	6-7/8"	1"				

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6BA6	0V	0V	6.3VDC	0V	200VDC	95VDC	2.8VDC	
V 2	6BE6	5-1.4VDC	1VDC	6.3VDC	0V	200VDC	95VDC	-.4VDC	
V 3	6BA6	0V	0V	6.3VDC	0V	200VDC	95VDC	2VDC	
V 4	6AT6	-1VDC	0.5VDC	6.3VDC	0V	.7VDC	0V	80VDC	
V 5	6AT6	0V	1.1VDC	6.3VDC	0V	1.1VDC	1.1VDC	80VDC	
V 6	6V6GT	0V	6.3VDC	6.3VDC	250VDC	0V	0V	0V	300VDC
V 7	6V6GT	0V	6.3VDC	6.3VDC	250VDC	0V	0V	0V	300VDC
V 8	6X4	300VAC	300VAC	6.3VDC	0V	NC	300VAC	300VDC	

STATION WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6BA6	0.5 Meg.	0Ω	.1Ω	0Ω	19.8KΩ	118KΩ	270Ω	
V 2	6BE6	47KΩ	20KΩ	.1Ω	0Ω	12.8KΩ	118KΩ	2 Meg.	
V 3	6BA6	2 Meg.	0Ω	.1Ω	0Ω	12.8KΩ	118KΩ	820Ω	
V 4	6AT6	0.5 Meg.	1.5MΩ	.1Ω	0Ω	340KΩ	1 Meg.	180KΩ	
V 5	6AT6	47KΩ	2.2MΩ	.1Ω	0Ω	2.2MΩ	1.2MΩ	180KΩ	
V 6	6V6GT	Inf.	.1Ω	710Ω	70Ω	850KΩ	Inf.	0Ω	220Ω
V 7	6V6GT	Inf.	.1Ω	710Ω	70Ω	850KΩ	Inf.	0Ω	220Ω
V 8	6X4	200Ω	10KΩ	.1Ω	0Ω	Inf.	180Ω	40KΩ	

*Measured From Pin 7 Of V8.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949

4915-12

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Battery voltage maintained at 6 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

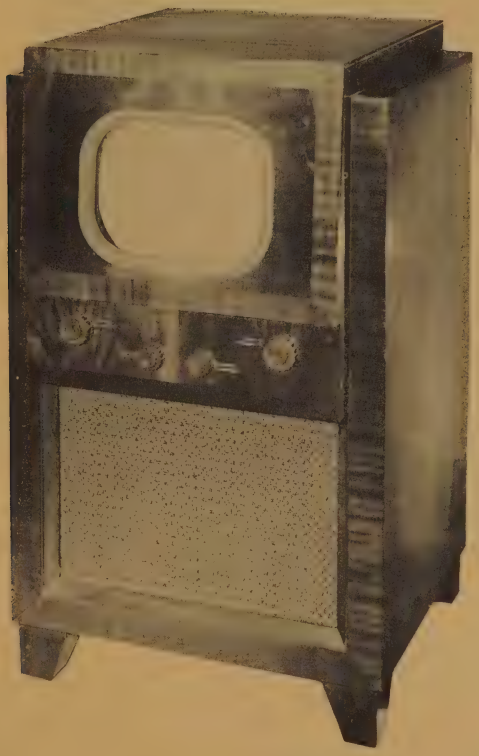
PHOTOFACT* Folder

MOTOROLA MODELS VT105, VT105M, VK106, VK106B, VL106M, VT107, VT107M (CH. TS-9, 9A, 9B, 9C)

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



Model VK106

MOTOROLA MODELS VT105, VT105M, VK106, VK106B, VL106M, VT107, VT107M (CH. TS-9, 9A, 9B, 9C)

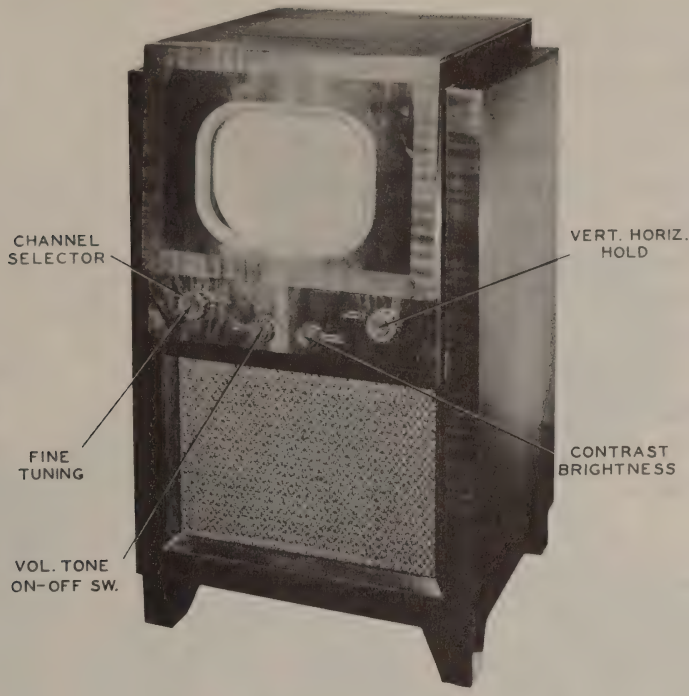
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

Date 8/49—No. 4915-13 Set No. 67—Folder No. 13

PHOTOFACT* Folder

MOTOROLA MODELS VT105, VT105M, VK106, VK106B, VK106M, VT107, VT107M



MOTOROLA MODEL VK-106

TRADE NAME	Motorola Models VT-105,VT-105M,VK-106,VK-106B,VK-106M,VT-107,VT-107M, (Ch. TS-9,TS-9A,TS-9B,TS-9C)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Twenty-Three (Ch. TS-9,TS-9B), Twenty-One (Ch. TS-9A), Twenty-Two (Ch. TS-9C)

POWER SUPPLY 105-125 Volts, 60 Cycles AC RATING: 2.1 Amps. @ 117 Volts
TUNING RANGE—Channels 2 thru 13.

INDEX

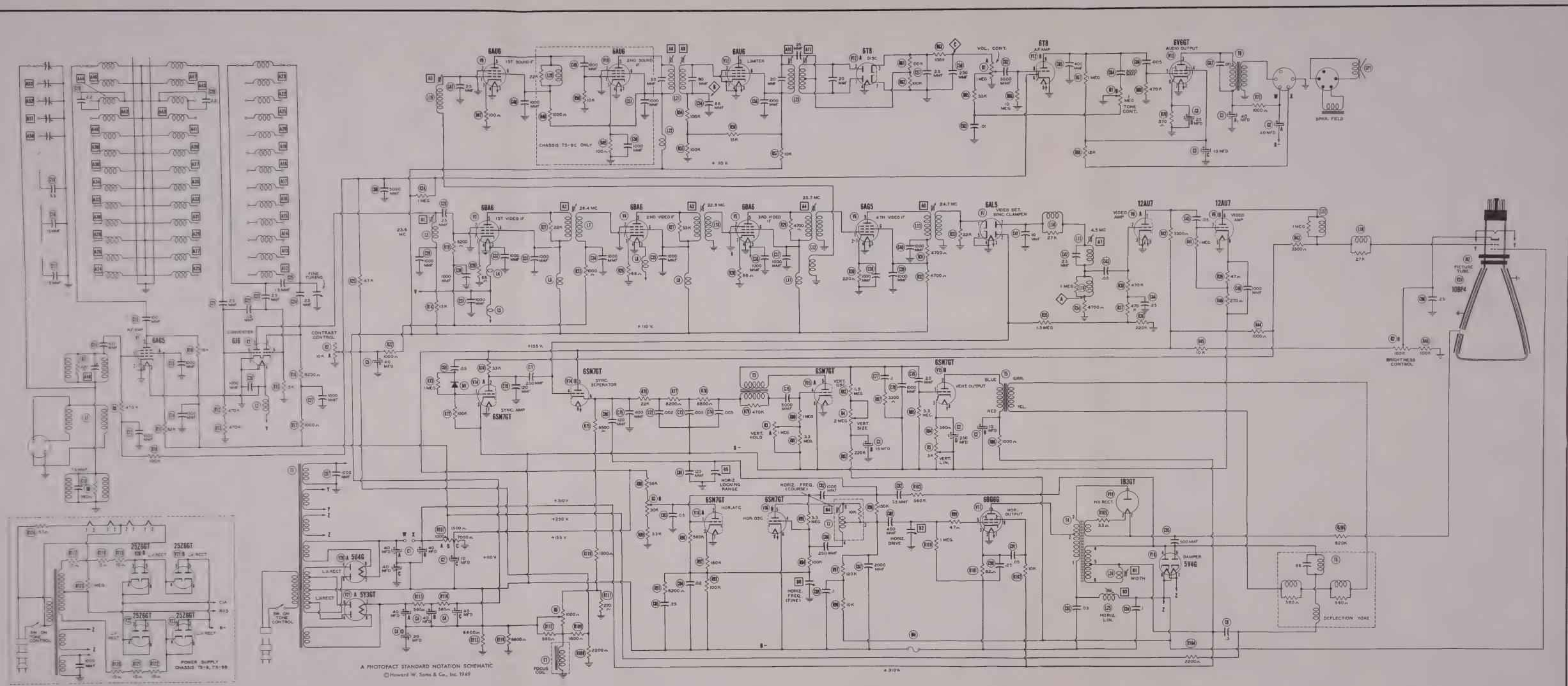
	Page		Page
Alignment Instructions	6,7	Photographs (continued)	
Block Diagram	14	Oscillator Alignment Points	7
Chassis Variations	15	RF Alignment Points	10
Disassembly Instructions	15	Resistor Identification	13,20
Horizontal Sweep Adjustments	15	Trans., Inductor and Alignment Identification	4,9
Parts List and Description	16,17,18,19	Schematic	2
Photographs		Schematic (Chassis Variations)	22
Cabinet-Rear View	19	Tube Placement Chart	5
Capacitor Identification	12,21	Voltage and Resistance Measurements	8
Chassis-Top View	3,11		

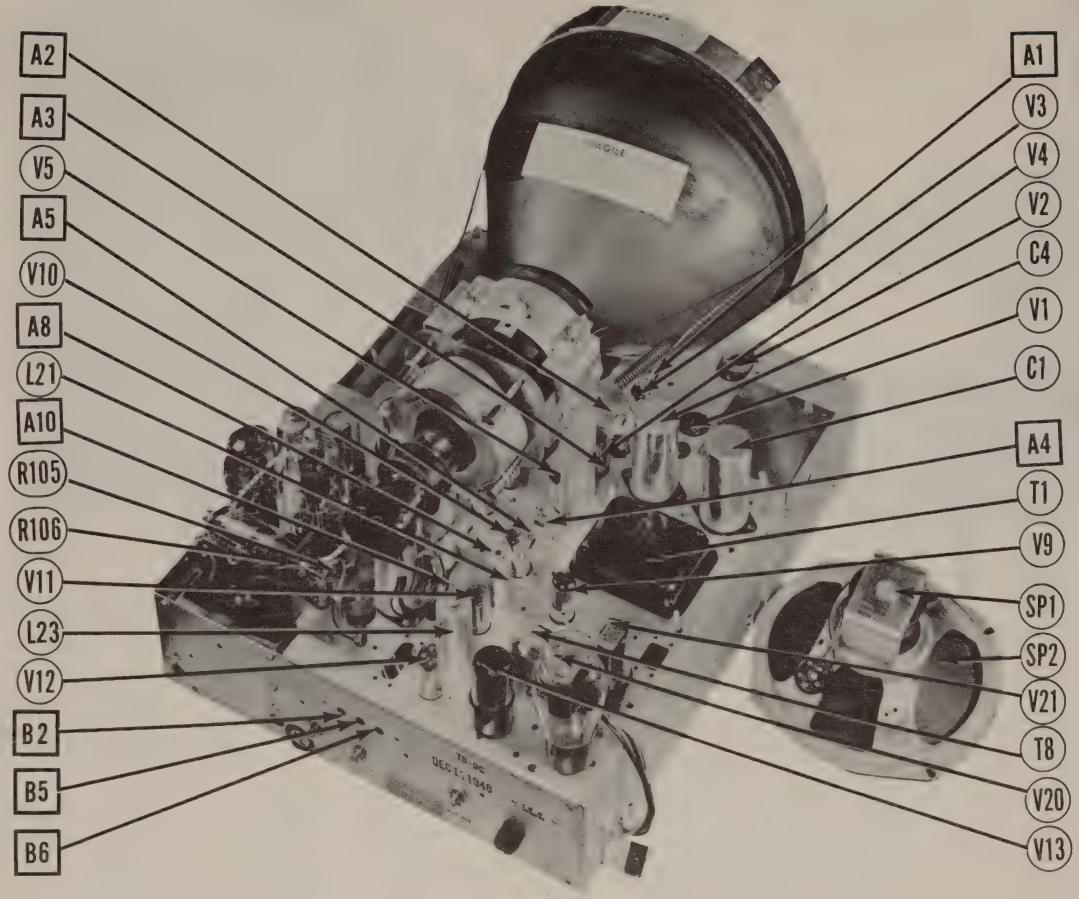
MOTOROLA MODELS VT105, VT105M, VK106, VK106B, VK106M, VT107, VT107M

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

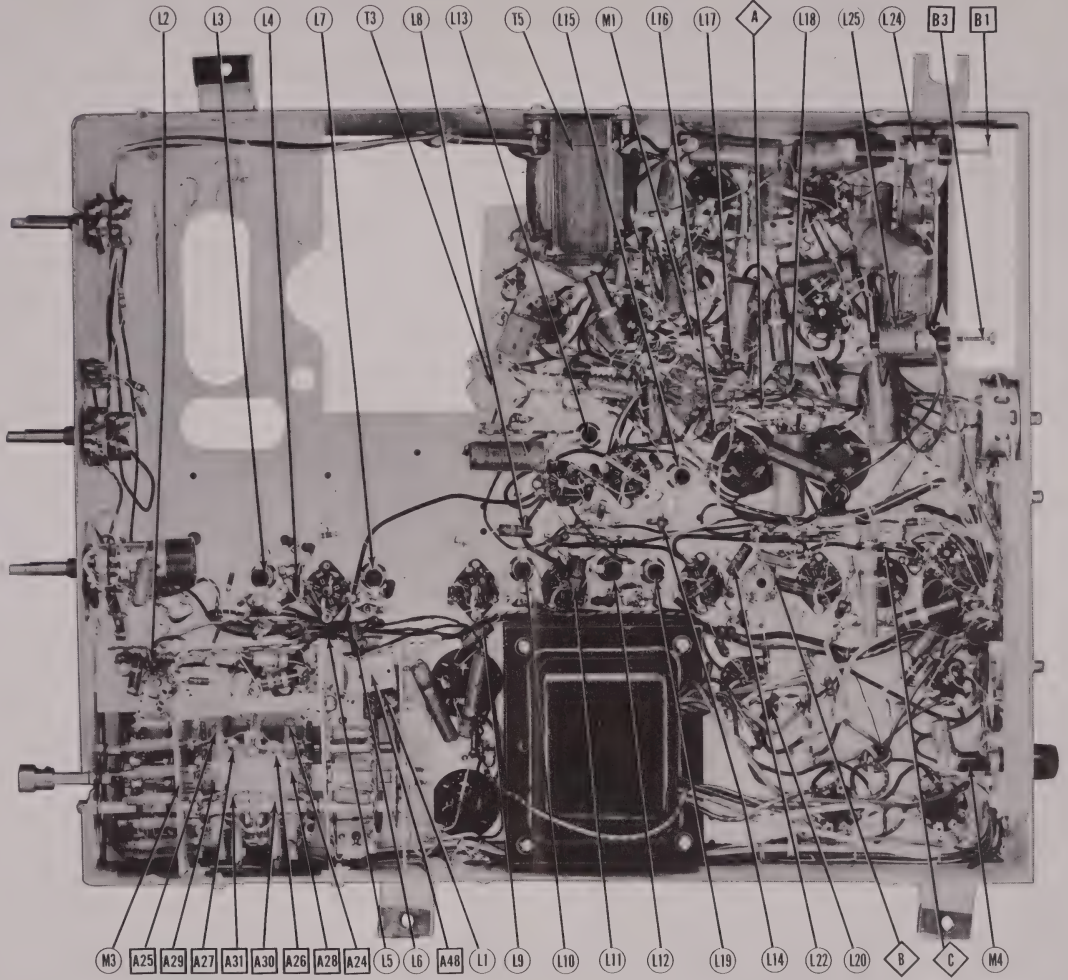
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 8/49 4915-13 SET #67 FOLDER 13

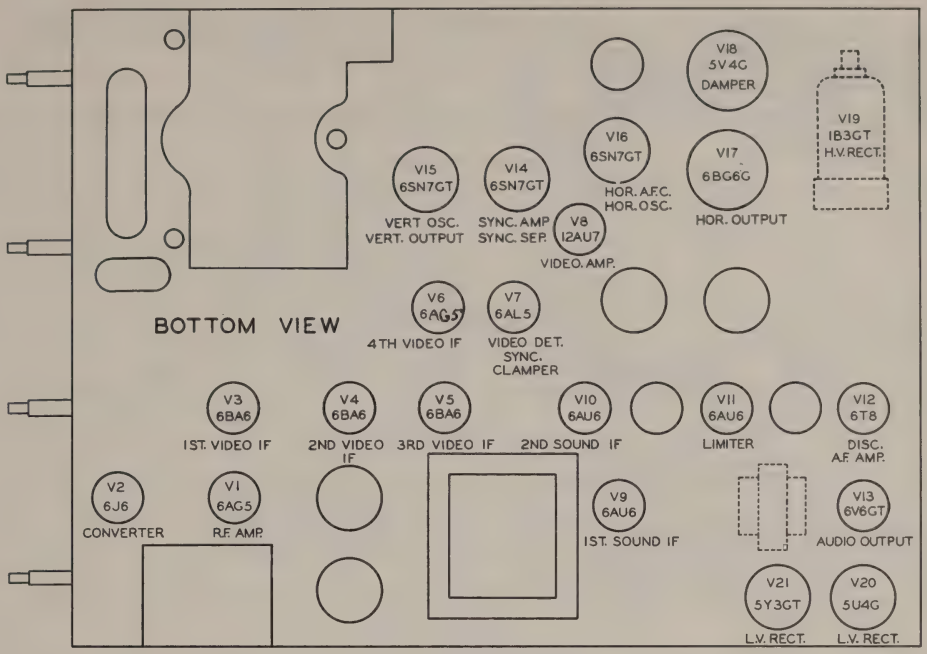

MOTOROLA MODELS VT105, VT105M, VK106, VK106B, VK106M, VT107, VT107M
6AU6
1ST SOUND IF
6AU6
2ND SOUND IF
6AU6
LIMITER
6T8
DISC
VOL. CONT.
6T8
AF AMP
6V6GT
AUDIO OUTPUT
3PKR. FIELD
CHASSIS TS-9C ONLY
+ 110 V.
6BA6
1ST VIDEO IF
6BA6
2ND VIDEO IF
6BA6
3RD VIDEO IF
6AG5
4TH VIDEO IF
6AL5
VIDEO DET. SYNC. CLAMPER
12AU7
VIDEO AMP
12AU7
VIDEO AMP
PICTURE TUBE
10BP4
BRIGHTNESS CONTROL
6AG5
RF AMP
6J6
CONVERTER
FINE TUNING
CONTRAST CONTROL
6SN7GT
SYNC. SEPERATOR
SYNC. AMP
6SN7GT
VERT. OSC.
6SN7GT
VERT. OUTPUT
VERT. HOLD
VERT. SIZE
VERT. LIN.
+155 V.
+310 V.
+250 V.
+155 V.
+110 V.
6SN7GT
HOR. AFC
6SN7GT
HOR. OSC
6BG6G
HOR. OUTPUT
1B3GT
H.V. RECT.
HORIZ. LOCKING RANGE
HORIZ. FREQ. (COARSE)
HORIZ. FREQ. (FINE)
HORIZ. DRIVE
WIDTH
HORIZ. LIN.
DAMPER
5V4G
DEFLECTION YOKE
FOCUS COIL
5U4G
L.V. RECT.
5Y3GT
L.V. RECT.
SW. ON TONE CONTROL
25Z6GT
25Z6GT
25Z6GT
25Z6GT
L.V. RECT.
L.V. RECT.
L.V. RECT.
L.V. RECT.
POWER SUPPLY CHASSIS TS-9, TS-9B
A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1949

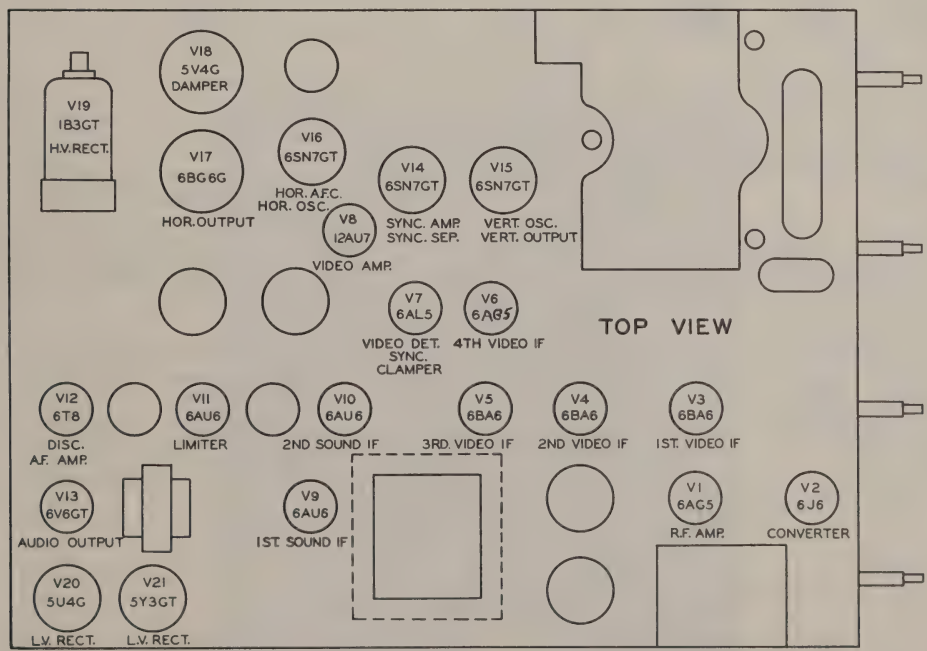


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION


BOTTOM VIEW
V18 5V4G DAMPER
V19 1B3GT H.V.RECT.
V16 6SN7GT HOR. A.F.C. HOR. OSC.
V17 6BG6G HOR. OUTPUT
V15 6SN7GT VERT OSC. VERT. OUTPUT
V14 6SN7GT SYNC. AMP SYNC. SEP.
V8 12AU7 VIDEO. AMP.
V6 6AG5 4TH VIDEO IF
V7 6AL5 VIDEO DET. SYNC. CLAMPER
V3 6BA6 1ST. VIDEO IF
V4 6BA6 2ND VIDEO IF
V5 6BA6 3RD VIDEO IF
V10 6AU6 2ND SOUND IF
V11 6AU6 LIMITER
V12 6T8 DISC. A.F. AMP.
V2 6J6 CONVERTER
V1 6AG5 R.F. AMP.
V9 6AU6 1ST. SOUND IF
V13 6V6GT AUDIO OUTPUT
V21 5Y3GT L.V. RECT.
V20 5U4G L.V. RECT.


TOP VIEW
V18 5V4G DAMPER
V19 1B3GT H.V.RECT.
V17 6BG6G HOR. OUTPUT
V16 6SN7GT HOR. A.F.C. HOR. OSC.
V14 6SN7GT SYNC. AMP SYNC. SEP.
V15 6SN7GT VERT. OSC. VERT. OUTPUT
V8 12AU7 VIDEO AMP.
V7 6AL5 VIDEO DET. SYNC. CLAMPER
V6 6AG5 4TH VIDEO IF
V12 6T8 DISC. A.F. AMP.
V11 6AU6 LIMITER
V10 6AU6 2ND SOUND IF
V5 6BA6 3RD. VIDEO IF
V4 6BA6 2ND VIDEO IF
V3 6BA6 1ST. VIDEO IF
V13 6V6GT AUDIO OUTPUT
V9 6AU6 1ST. SOUND IF
V1 6AG5 R.F. AMP.
V2 6J6 CONVERTER
V20 5U4G L.V. RECT.
V21 5Y3GT L.V. RECT.

TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

VIDEO IF ALIGNMENT

Connect the negative terminal of a -3 volt battery to the mixer grid at the junction of R12 and R13. Connect the positive terminal to chassis ground.
Set the contrast control to give -5 volt bias. (Measure from center terminal to chassis.)

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.01MFD	High side to pin 5 (Grid) of 6J6 (V2). Low side to chassis.	23.6MC	Any	DC Probe to Point (A) Common to chassis.	A1	Adjust for maximum deflection.
2.	.01MFD	"	26.4MC	"	"	A2	" " " "
3.	.01MFD	"	22.9MC	"	"	A3	" " " "
4.	.01MFD	"	25.7MC	"	"	A4	" " " "
5.	.01MFD	"	21.9MC	"	"	A5	Adjust for minimum deflection. Repeat step 4.
6.	.01MFD	"	24.7MC	"	"	A6	Adjust for maximum deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal amplifier of the oscilloscope to give horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 5 (Grid) of 6J6 (V2). Low side to chassis	24MC (10MC Sweep)	21.9MC 26.4MC	Any	Vert. Amp. to Point (A) Low side to chassis.		Check to see that response curve is similar to that of Fig 1.

4.5MC TRAP ADJUSTMENT

There are three possible methods of adjusting this trap.
One method is done by tuning in a normal picture and adjusting trap A7 so the stippled or half-tone effect in the picture is eliminated or minimized. The fine tuning control should be set on the center audio peak while this adjustment is being made.
Another method is by feeding a 4.5MC unmodulated signal to pin 7 of 6AL5 (V7) video detector and connecting an RF type electronic voltmeter across R41 (2nd video amp. grid circuit). Adjust A7 for minimum.
The third method of using an oscilloscope with a detector probe may be accomplished as follows:

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.01MFD	High side to pin 7 of 6AL5 (V7). Low side to chassis.	Off	4.5MC (400∿ Mod.)	Any	Vert. Amp. thru detector probe to pin 6 (plate) of 12AU7 (V8). Low side to chassis.	A7	Adjust for minimum amplitude.

SOUND IF ALIGNMENT

Chassis TS-9C contains an additional sound IF stage but the transformer added is fixed tuned and does not necessitate a change in alignment procedure.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.01MFD	High side to pin 5 (Grid) of 6J6 (V2). Low side to chassis.	21.9MC	Any	DC Probe to Point (B) Common to chassis.	A8,A9	Adjust for maximum deflection.
10.	Detune the discriminator transformer secondary by turning All out approximately 2 full turns.						
11.	.01MFD	High side to pin 5 (Grid) of 6J6 (V2). Low side to chassis.	21.9MC	Any	DC Probe to Point (C) Common to chassis.	A10	Adjust for maximum deflection.
12.	.01MFD	"	"	"	"	A11	Adjust for zero reading. A positive and negative peak is obtained on either side of the correct setting.

RF ALIGNMENT

Connect the signal generator to the antenna terminals of the receiver through two resistors. The low side of the generator should be connected through 150Ω. The high side should be connected through a resistor of 150Ω minus the signal generator impedance. For instance, if the generator impedance is 50Ω, the resistor should be 100Ω.
Leave the fine tuning control set at the midpoint of its electrical range during the oscillator and RF alignment.
Set the contrast control for -3 volts bias. (Measured from arm of control to chassis).
The antenna adjustments on the high band is made at 195MC for channels 7,8,9,10,11,12 and 13. This adjustment has enough bandwidth to work effectively over all these channels. The low band channels have individual antenna adjustments.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13.	See Instructions above	Across antenna terminals.	215.75MC	13	DC Probe to Point (C) Common to chassis.	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
14.	"	"	209.75MC	12	"	A13	"
			203.75MC	11		A14	
			197.75MC	10		A15	
			191.75MC	9		A16	
			185.75MC	8		A17	
			179.75MC	7		A18	
			87.75MC	6		A19	
			81.75MC	5		A20	
			71.75MC	4		A21	
			65.75MC	3		A22	
			59.75MC	2		A23	

ALIGNMENT INSTRUCTIONS (CONT.)

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
15.	"	"	214MC	13	"	A24, A25	Unscrew one adjustment until the circuit is appreciably detuned. Adjust the second slug for maximum deflection. Then adjust the first slug for maximum. Do not retune the other slug.
16.	"	"	208MC	12	"	A26,A27	"
			202MC	11		A28,A29	
			196MC	10		A30,A31	
			190MC	9		A32,A33	
			184MC	8		A34,A35	
			178MC	7		A36,A37	
			86MC	6		A38,A39	
			80MC	5		A40,A41	
			70MC	4		A42,A43	
			64MC	3		A44,A45	
			58MC	2		A46,A47	
17.	"	"	195MC	10	"	A48	Adjust for maximum deflection.
			86MC	6		A49	Adjust for maximum deflection. A49 is omitted on TS-9C.
			80MC	5		A50	Adjust for maximum deflection.
			70MC	4		A51	"
			64MC	3		A52	"
			58MC	2		A53	

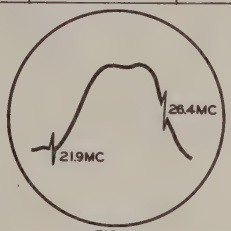
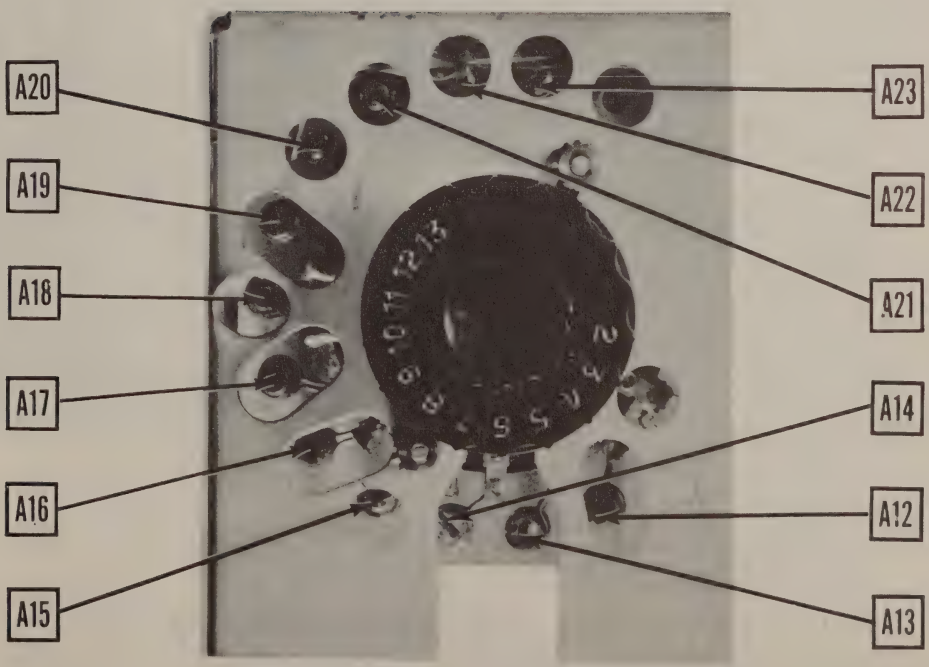


FIG.1



OSCILLATOR ALIGNMENT POINTS

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-3.4VDC	0V	6.3VAC	0V	245VDC	245VDC	0V		
V 2	6J6	150VDC	87VDC	0V	6.3VAC	-3.4VDC	§-1VDC	0V		
V 3	6BA6	-20VDC	0V	6.3VAC	0V	118VDC	118VDC	.1VDC		
V 4	6BA6	-20VDC	0V	6.3VAC	0V	118VDC	118VDC	.1VDC		
V 5	6BA6	0V	0V	6.3VAC	0V	118VDC	118VDC	1VDC		
V 6	6AG5	0V	1VDC	6.3VAC	0V	60VDC	80VDC	1VDC		
V 7	6AL5	0V	-1.2VDC	6.3VAC	0V	0V	60VDC	-.1VDC		
V 8	12AU7	125VDC	-.5VDC	0V	0V	0V	♦155VDC	♦.5VDC	♦5VDC	6.3VAC
V 9	6AU6	0V	0V	6.3VAC	0V	110VDC	110VDC	5VDC		
V 10	6AU6	0V	0V	6.3VAC	0V	120VDC	120VDC	1VDC		
V 11	6AU6	-.5VDC	0V	6.3VAC	0V,	50VDC	50VDC	0V		
V 12	6T8	-.7VDC	-.8VDC	-9.3VDC	0V	6.3VAC	-13VDC	0V	-.1VDC	50VDC
V 13	6V6GT	0V	6.3VAC	270VDC	270VDC	0V	300VDC	0V		
V 14	6SN7GT	♦0V	♦60VDC	♦0V	♦50VDC	♦ 225VDC	♦68VDC	0V	6.3VAC	
V 15	6SN7GT	♦0V	♦360VDC	♦10VDC ♦19.5VDC	♦-28VDC	♦80VDC ♦150VDC	♦0V	0V	6.3VAC	
V 16	6SN7GT	♦-.7VDC	♦133VDC	♦17VDC	-41VDC	♦140VDC	♦0V	0V	6.3VAC	
V 17	6BG6G	♦3VDC	0V	♦11VDC	♦320VDC	♦.5VDC	♦370VDC	6.3VAC	♦270VDC	TOP CAP *
V 18	5V4G	0V	390VDC	♦3VDC	310VDC	♦3VDC	310VDC		390VDC	
V 19	1B3GT	* DO NOT MEASURE								
V20A	5U4G	0V	325VDC	325VDC	380VAC	280VDC	380VAC	57VAC	325VDC	
V21A	5Y3GT	0V	175VDC	0V	240VAC	0V	240VAC	0V	187VDC	
V24	10BP4	160VDC	93VDC	PIN 10 390VDC	PIN 11 160VDC	PIN 12 160VDC				

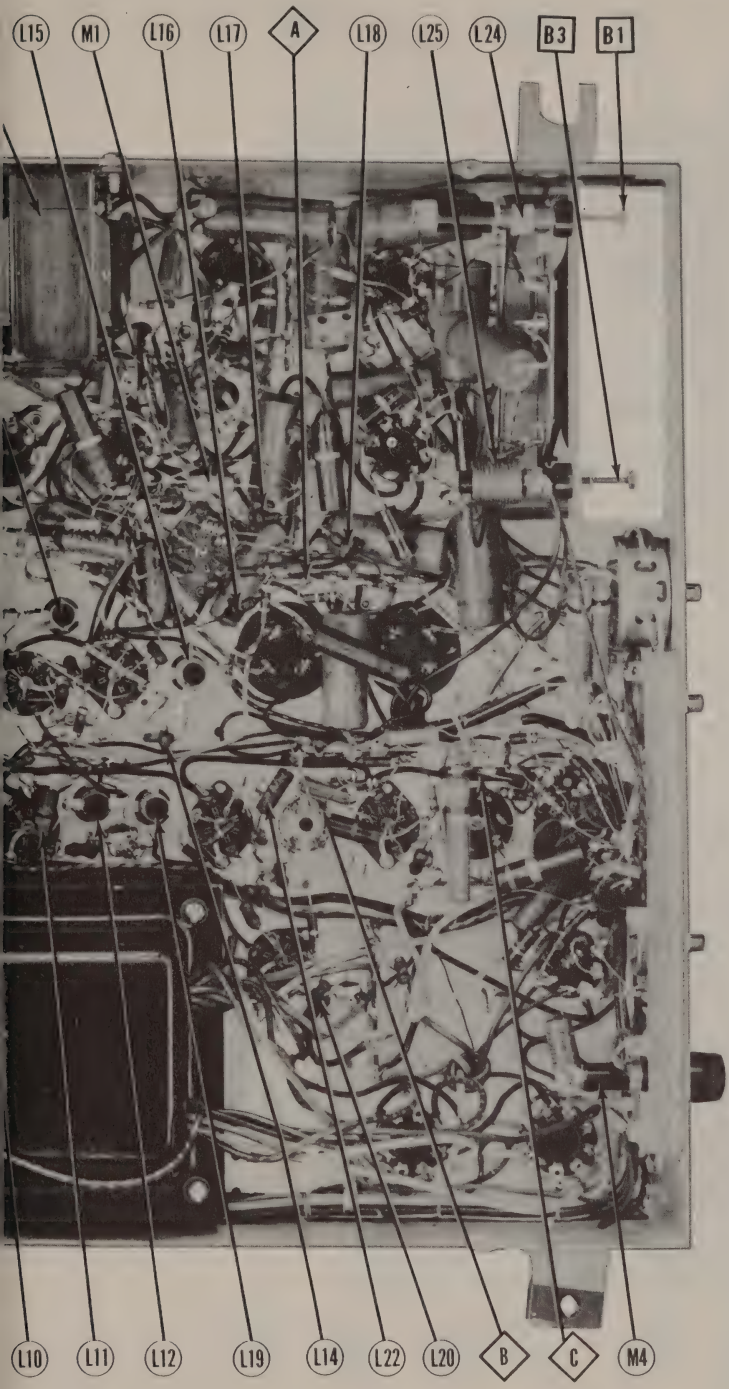
♦ Measured from pin 6 of V15.
§ Taken with vacuum tube voltmeter.
* Do not measure.

RESISTANCE READINGS

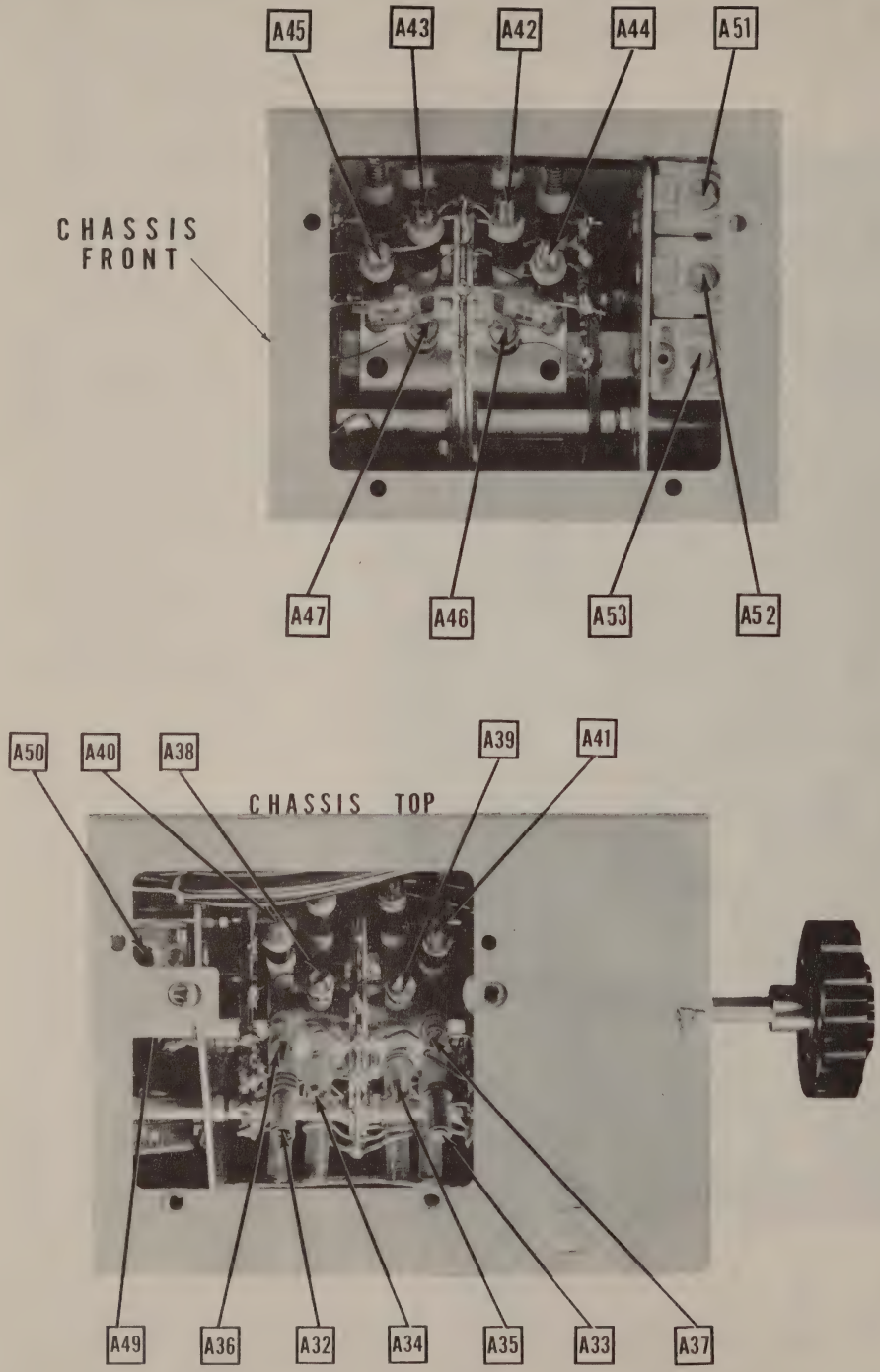
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	630KΩ	0Ω	.1Ω	0Ω	†20KΩ	†80KΩ	0Ω		
V 2	6J6	†10KΩ	‡15KΩ	0Ω	.1Ω	1 Meg.	13KΩ	0Ω		
V 3	6BA6	10KΩ	0Ω	.1Ω	0Ω	‡1.2KΩ	‡1.2KΩ	68Ω		
V 4	6BA6	3KΩ	0Ω	.1Ω	0Ω	‡1.2KΩ	‡1.2KΩ	68Ω		
V 5	6BA6	.1Ω	0Ω	.1Ω	0Ω	‡1.2KΩ	‡1.2KΩ	68Ω		
V 6	6AG5	.2Ω	200Ω	.1Ω	0Ω	‡11KΩ	‡6KΩ	200Ω		
V 7	6AL5	0Ω	2 Meg.	.1Ω	0Ω	0Ω	‡11KΩ	5KΩ		
V 8	12AU7	†5.2KΩ	1.2 Meg.	0Ω	0Ω	0Ω	†6.2KΩ	1.2 Meg.	315Ω	.1Ω
V 9	6AU6	.1Ω	0Ω	.1Ω	0Ω	‡2KΩ	‡2KΩ	100Ω		
V 10	6AU6	10KΩ	0Ω	.1Ω	0Ω	‡1000Ω	‡1000Ω	100Ω		
V 11	6AU6	100KΩ	0Ω	.1Ω	0Ω	‡10KΩ	‡10KΩ	0Ω		
V 12	6T8	100KΩ	100KΩ	160KΩ	0Ω	.1Ω	47KΩ	0Ω	10 Meg.	† 1 Meg.
V 13	6V6GT	0Ω	.1Ω	†1.2KΩ	†12KΩ	470KΩ	†850Ω	0Ω	500Ω	
V 14	6SN7GT	♦100KΩ	†35KΩ	♦0Ω	2 Meg.	†2KΩ	♦7.5KΩ	0Ω	.1Ω	
V 15	6SN7GT	♦3.3Meg.	†1.5KΩ	♦5.5KΩ ♦600Ω	♦ 1 Meg.	♯3.8Meg. ♯1.6Meg.	♦0Ω	0Ω	.1Ω	
V 16	6SN7GT	♦750KΩ	†35KΩ	♦280KΩ	♦200KΩ	♯140KΩ	♦0Ω	0Ω	.1Ω	
V 17	6BG6G	♦15Ω	0Ω	♦100Ω	†800Ω	♦1 Meg.	†110Ω	.1Ω	†10KΩ	TOP CAP ♯200Ω
V 18	5V4G	Inf.	♯0Ω	♦15Ω	†95Ω	♦15Ω	†95Ω	♦1 Meg.	♯0Ω	
V 19	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ♯360Ω
V20A	5U4G	Inf.	10KΩ	10KΩ	480Ω	10KΩ	470Ω	440Ω	10KΩ	
V21A	5Y3GT	Inf.	24KΩ	Inf.	480Ω	Inf.	460Ω	Inf.	24KΩ	
V24	10BP4	†15KΩ	†6.2KΩ	PIN 10 ♯0Ω	PIN 11 †15KΩ	PIN 12 †15KΩ				

† Measured from pin 2 of V20
‡ Measured from pin 2 of V21
♯ Measured from pin 8 of V18
♦ Measured from pin 6 of V15

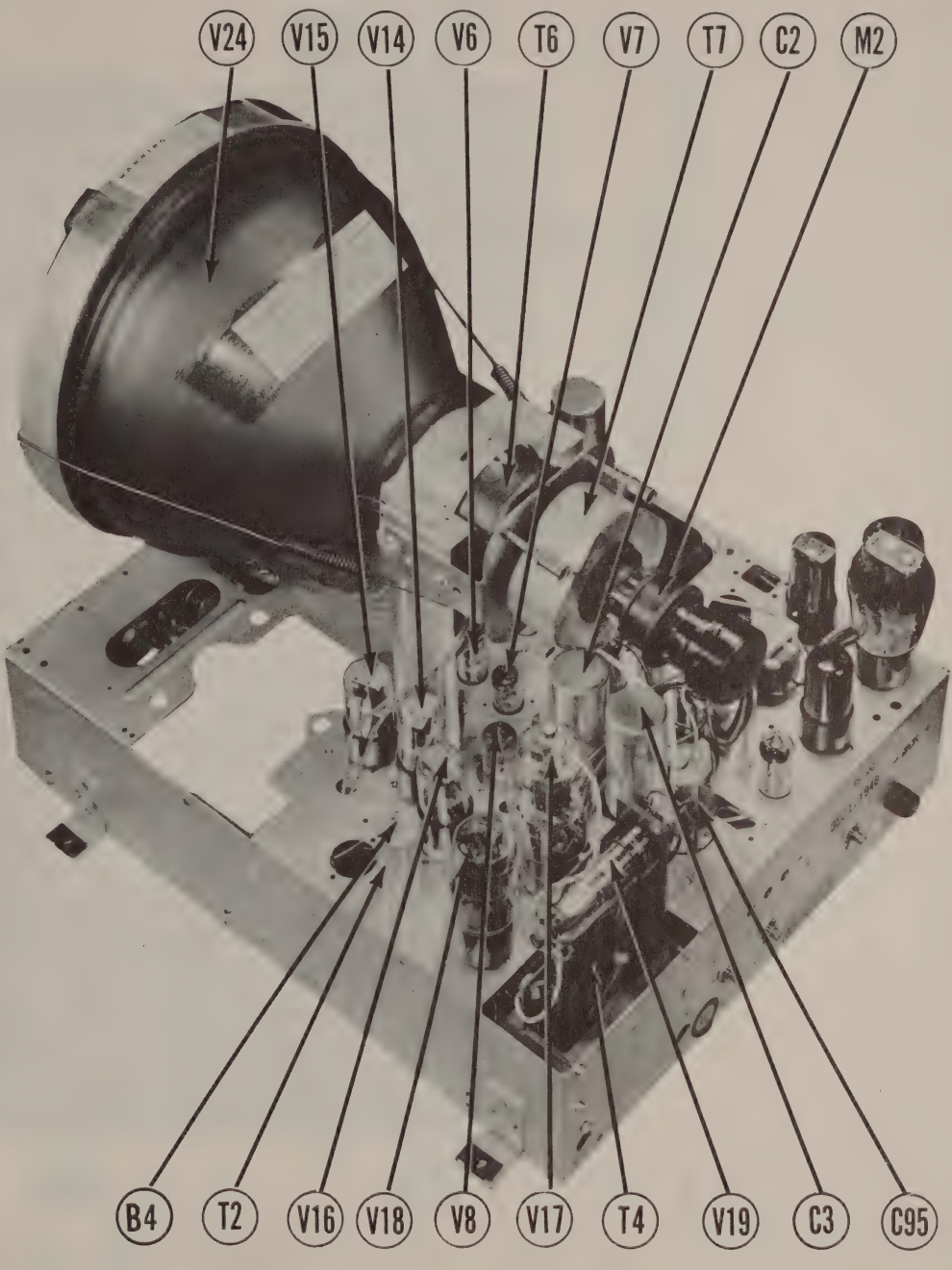
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



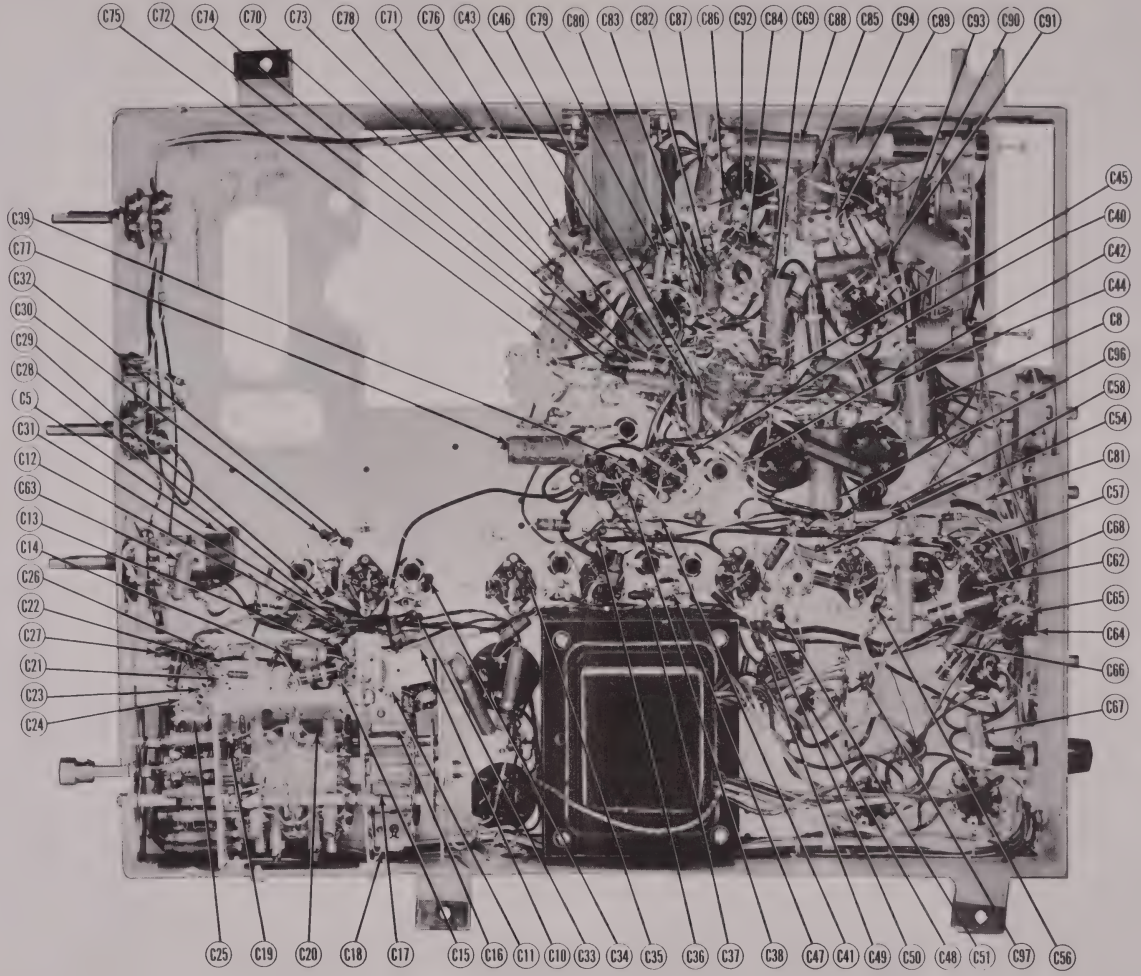
:TOR AND ALIGNMENT IDENTIFICATION



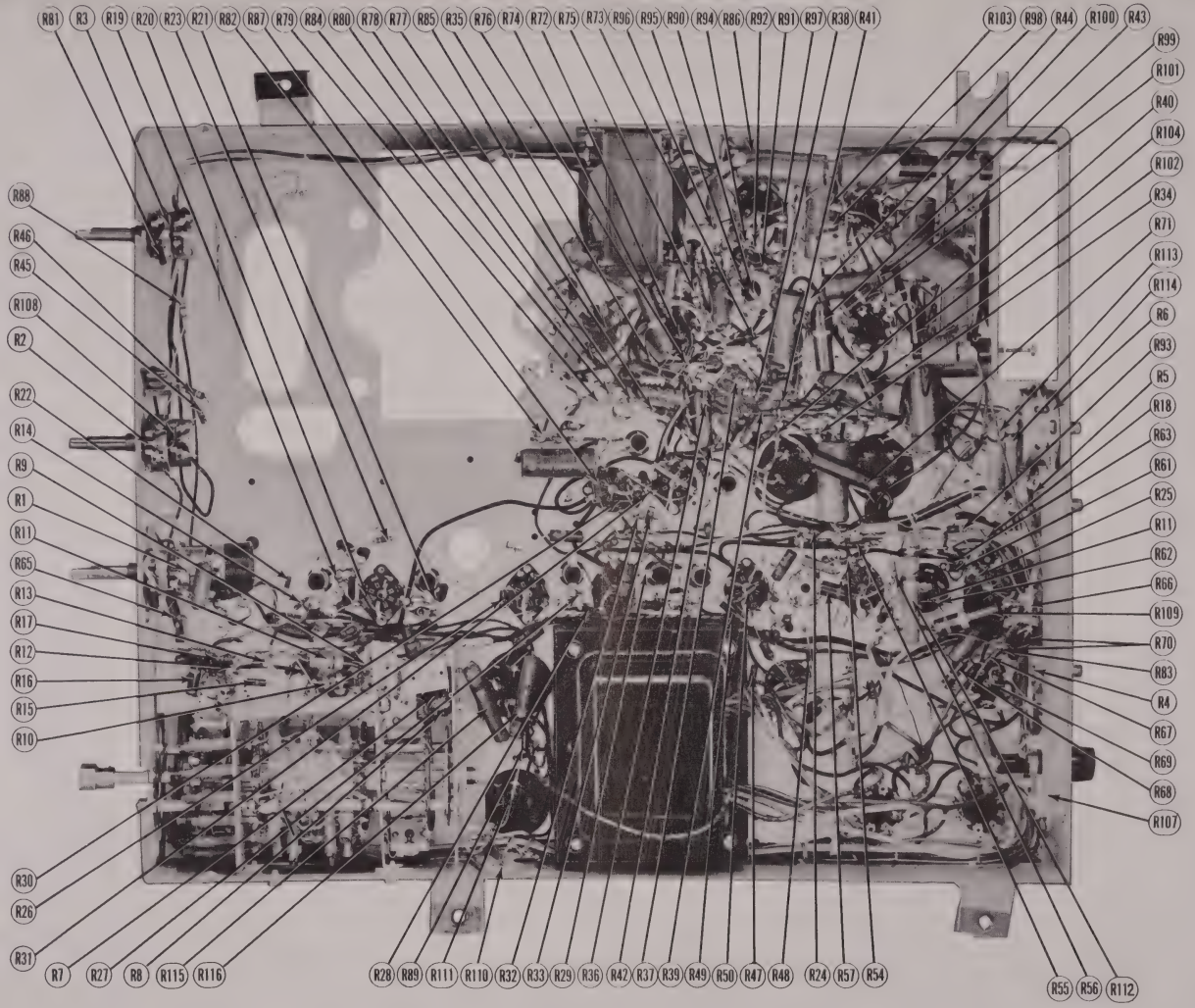
RF ALIGNMENT POINTS



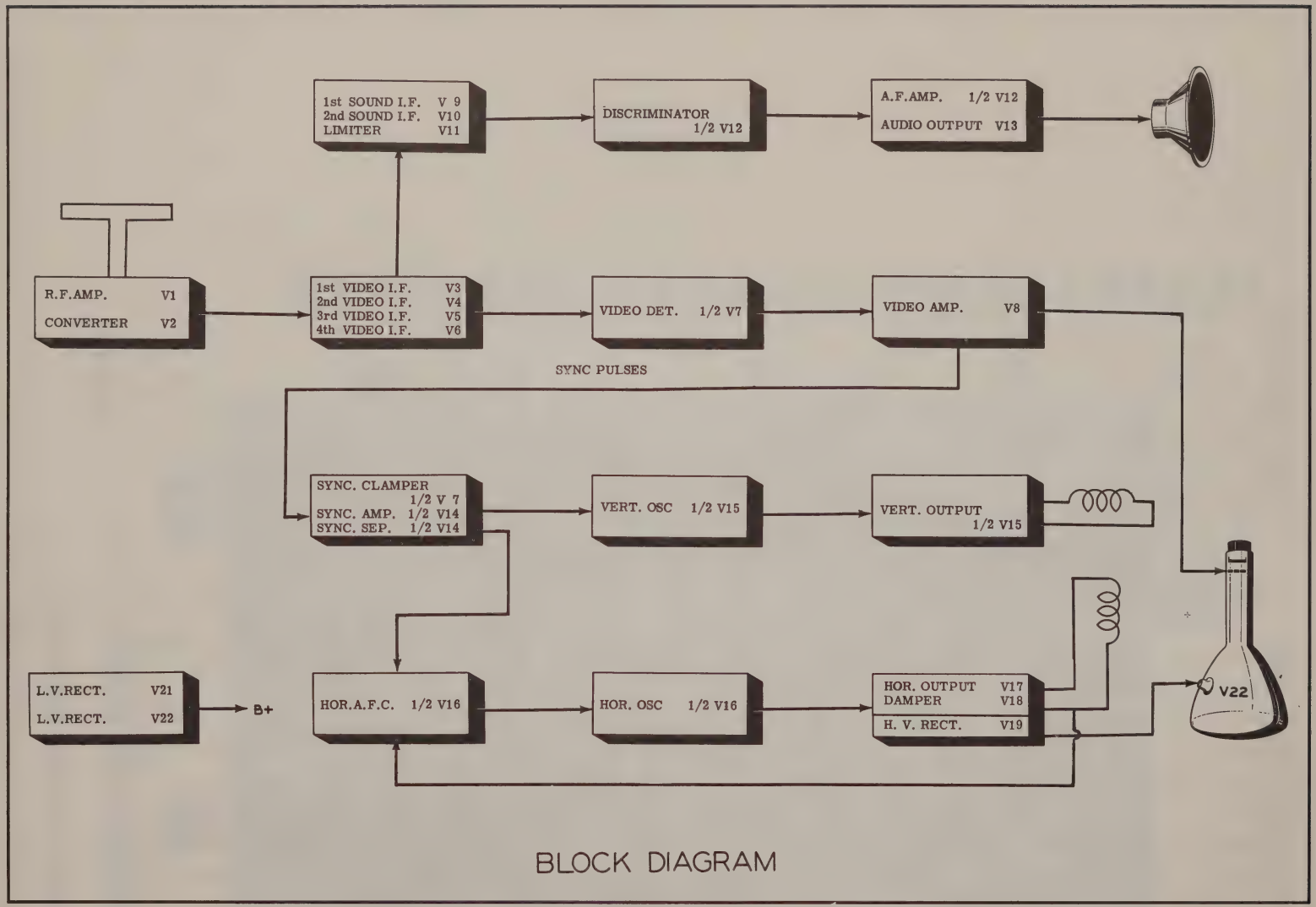
CHASSIS-TOP VIEW



CHASSIS BOTTOM VIEW–CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



BLOCK DIAGRAM

BRIEF DESCRIPTION OF CHASSIS VARIATIONS

CHASSIS TS-9. Twenty-two tubes plus 10" picture tube employing four type 25Z6GT tubes operating in a bridge circuit to supply "B" power.

CHASSIS TS-9A. Same as TS-9 except a conventional power supply circuit is used having 5Y3GT and 5U4G tubes. The power transformer also differs from the one used in chassis TS-9. Twenty tubes plus 10" picture tube.

CHASSIS TS-9B. Same as TS-9 except that the 1st Sound IF Amplifier is also used as a reflex amplifier for audio to obtain greater audio amplification. Twenty two tubes plus 10" picture tube.

CHASSIS TS-9C. Similar to TS-9A except that an additional Sound IF stage was added to reduce variations in sound level with setting of contrast control. Twenty-one tubes plus 10" picture tube.

HORIZONTAL OSCILLATOR ADJUSTMENT

Adjust the horizontal oscillator coil slug (B4) so the picture will "lock-in" over the whole range of the horizontal hold control. If this cannot be done, back off the horizontal locking trimmer (B5) 2 1/2 to 3 turns from tight or until it is possible to sync the picture over the whole range of the horizontal hold control. (If this is not possible, the receiver is defective and will require tube and circuit component checks.)

When this has been done, turn the horizontal hold control to the extreme counter-clockwise position.

Back off trimmer B6 (Horizontal frequency trimmer) until the pictue tends to slip to the right; then turn the horizontal hold control clockwise until picture "syncs" in.

Under these conditions, it should be possible to switch channels without losing synchronization.

HORIZONTAL LINEARITY AND SIZE ADJUSTMENT

Turn the horizontal size control (B1) fully clockwise. Vary the horizontal drive trimmer (B2) for best compromise between brightness and horizontal linearity. Adjust the horizontal size control (B1) until the picture fills the mask horizontally (8 1/2" minimum). Adjust the horizontal linearity control (B3) for the best horizontal linearity on the right half of the picture.

Due to interaction between B1 and B2, adjustment of one will require readjustment of the other.

DISASSEMBLY INSTRUCTIONS

MODEL VK106

1. Remove seven push-on type and one set screw type control knobs.
2. Remove screws holding back cover. Remove back cover.
3. Remove antenna plug at chassis.
4. Remove speaker plug from speaker.
5. Remove four 7/16" hex head bolts holding chassis. Remove chassis.
6. Remove four 5/16" hex nuts holding speaker. Remove speaker.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6AU6	6AU6	7BD	
V2	Converter	6J6	6J6	9BF	
V3	1st Video IF	6BA6	6BA6	7BK	
V4	2nd Video IF	6BA6	6BA6	7BK	
V5	3rd Video IF	6BA6	6BA6	7BK	
V6	4th Video IF	6AU6	6AU6	7BD	
V7	Video Det.-Sync. Sep.-Clamper	6AL5	6AL5	6BT	
V8	Video Amp.	12AV7	9A	9CH	
V9	1st Sound IF	6AU6	6AU6	7BK	Used in chassis TS-9C only.
V10	2nd Sound IF	6AU6	6AU6	7BK	
V11	Limiter	6AU6	6AU6	7BK	
V12	Disc.-AF Amp.	6J6	6J6	9BF	
V13	Audio Output	6V6GT	6V6GT	7AC	
V14	Sync. Amp.-Sync. Clipper	6SN7GT	6SN7GT	8BD	
V15	Vert. Osc.-Vert. Output	6SN7GT	6SN7GT	8BD	
V16	Hor. Output	6BK5B	6BK5B	8BT	
V17	Damper	5V4G	5V4G	5L	
V18	Rectifier	1B3GT	1B3GT	5C	
V19	Vert. Rect.	1N34	1N34	1T	Used in chassis TS-9A and TS-9C.
V20	Vert. Rect.	1Z2GT	1Z2GT	7J	Used in chassis TS-9 and TS-9B.
V21A	H.V. Rect.	5Y3GT	5Y3GT	5G	Used in chassis TS-9A and TS-9C.
V21B	H.V. Rect.	1Z2GT	1Z2GT	7J	Used in chassis TS-9 and TS-9B.
V22	H.V. Rect.	1N34A	1N34A	1T	Used in chassis TS-9 and TS-9B.
V23	H.V. Rect.	1Z2GT	1Z2GT	7J	Used in chassis TS-9 and TS-9B.
V24	Picture Tube	10BP4	10BP4		

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	23A484197	AFH88J8D	UP11CJ			TVL-54	▪ Filter
B	40	450			1067				▪ Filter
C	40	150							▲ Filter
C2A	40	450	23A484196	AFH82Z250A	UP9DJ			TVL-40	▪ Filter
B	10	450			1068			TVA-9	▪ Filter
C	10	450							▲ Filter
D	25	25							▲ Vert. Output Cath. Byp.
C3A	40	450	23A484195	AFH832J5A	UP9DJ			TVL-40	▪ Filter
B	15	450			1069			TVA-6	▪ Vert. Output Dec.
C	10	450							▲ Decoupling
D	25	25							Output Cath. Bypass
C4A	40	300	23A484194	AFH868D4D	UP9DJ			D6286	▪ Filter
B	40	300			1070				▪ Filter
C	40	300							▲ Filter
D	20	150							▲ Filter
C5	40	150	23A485454	PRS150/40	BR401B			UT-401	Bias Filter
C6A	40	450	23A484195		UP9DJ			TVL-40	▪ Filter
B	15	450			1069			TVA-6	▪ Decoupling
C	25	25							▲ Output Cath. Bypass
C7	10	450	23K489031	PRS450/10	BR1045		M-10-450	TVA-21	Vert. Output Decoup. †
C8A	50	50		50sr-5		GT2P5	S7-4-5	TC-2	Vert. Sweep Coupling †
B	150	50	23A485456					TVL-41	" " " "
		15, 750							
		250 wkg							
C9	10	450	23K489031	PRS450/10	BR1045		M-10-450	TVA-21	S. IF Decoupling ♦
C10	7.5		21K470736						Fixed Trimmer
C11	100		21K470736	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C12	1000		21K47841C	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Bias Filter ♦
C13	1000		21K47841C	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Screen Bypass
C14	1000		21K47841C	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Bypass
C15	180		21K470736	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C16	7.5	500	21K47736					MS-415	Fixed Trimmer
C17	15	500	21K82736					MS-415	" " "
C18	3.3								" " " $
C19	3.2		21K471216						" " "
C20	2.2		21K471216						" " "
C21	22		21A477017	1468-000025	5W5G25	GP1K-25	MO.5-425	MS-425	RF Coupling
C22	1.5		21K482296			NPOK-1.5			Osc. Coupling
C23	25		21A477038	1468-000025	5W5G25	GP1K-25	MO.5-425	MS-425	Osc. Grid Cap.
C24	25		21A477038	1468-000025	5W5G25	GP1K-25	MO.5-425	MS-425	Osc. Feedback
C26	1.5		21A477037			NPOK-1.5			Fixed Trimmer
C27	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Filament Bypass
C28	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Osc. Plate Decoupling
C28	25		21K478736	1468-000025	5W5G25	GP1K-25	MO.5-425	MS-425	IF Coupling ♦
C29	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Mixer Plate Dec.
C30	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Bias Filter
C31	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Filament Bypass
C32	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	1st IF Fil. Bypass
C33	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	1st IF Decoupling
C34	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Bias Filter
C35	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd IF Decoupling
C36	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	3rd IF Fil. Bypass
C37	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	3rd IF Decoupling
C38	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th IF Cath. Bypass
C39	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th IF Decoupling
C40	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th IF Plate Decoupling
C41	5		21K10C75	1468-00001	1W5E1	GP1K-15	MO.5-415	MS-415	Det. Coupler
C42	25		21K47836	1468-000025	5W5G25	NPOL-25	MO5.5-425	MS-425	Fixed Trimmer
C43	25, 100	400	8A471166		GT4P5		S7-4-05	TM-15	Video Coupling
C44A	.25	400			P488-25		S7-4-25	TC-2	Bias Filter
B	.1	400			P488-1	GT4P1	S7-4-1	TM-1	" " ♦
C45	.25, 400		8A471167		P488-26	GT4P5	S7-4-05	TM-15	Video Coupling ♦
C46	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Video Amp. Cath. Bypass
C47	25		21K28916	1468-000025	5R5G25	NPOL-25	MO5.5-425	MS-425	Fixed Trimmer
C48	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	1st S. IF Decoupling §
C49	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	S. IF Coupling §
C50	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd S. IF Cath. Byp. **
C51A	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd S. IF Decoupling **
B	5000		21A4707789	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	" " " "

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C52	1000		21K473410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	S. IF Screen Bypass ♦
C53	5000		21A470789	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Audio Coupling
C54	68	500		1468-000075	5W5J7	GP1K-75	MO5.5-47	MS-475	Limiter IF Grid ♦
C55	25		21K28816	1468-000025	5W5G25	GP1K-25	MO.5-425	MS-425	Sound IF Coupling ♦
C56	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Limiter Decoupling
C57	25		21K28816	1468-000025	5W5G25	GP1K-25	MO.5-425	MS-425	RF Bypass
C58	250	500	21R6662	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	De-emphasis
C59	5000		21A470789	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Audio Coupling ♦
C60	250			1468-00025	5W5T25	GP2K-250	MW.5-325	1FM-325	RF Bypass ♦
C61	.1	400	8K471169		P488-1	GT4P1	S7-4-1	TM-1	Bias Filter ♦
C62	5000		21A4707789	1467-05	1D5D5	GP2M-005	MW.5-25	1FM-21	Audio Coupling
C63	5000	100	8K471163	P488-01	1T2B1	GP2-335-01	S7-4-01	TM-11	Clam. Cap.
C64	5000		21A4707789	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	" " "
C65A	400	500	21R6664	1468-0004	5W5T4	GP2K-500	MO.5-34	1FM-34	AF Plate Bypass ♦
B	600			1468-0004	5W5T4	GP2K-600	S7-4-02	TM-25	" " "
C66	.005	600	8K471162	P688-005	0T6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C67	.005	600	8K471162	P688-005	0T6D5	GP2M-005	ST-6-005	TM-25	Output Plate Bypass
C68	5000		21A470789	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Bias Filter ♦
C69	.05	600	8A471151-A	P688-05	0T6S5		ST-6-05	TM-15	Sync. Coupling
C70	120		21K484150	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Sync. Amp. Plate Bypass
C71	250	500	21R6662	1468-00025	5W5T25	GP2K-250	MW.5-325	1FM-325	Sync. Coupling
C72	.002	400		P698-002	0T6D2	GP2M-002	ST-6-002	TM-22	Integrator Net. ♦
C73	.005	200		P688-005	0T6D5	GP2M-005	ST-6-005	TM-25	" " "
C74	.005	200		P688-005	0T6D5	GP2M-005	ST-6-005	TM-25	" " "
C75	5000	500	21R6667	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Vert. Osc. Grid Cap.
C76	470		8K48148	P478-5	0T4S5		ST-4-5	TM-15	Vert. Coupling
C77	.1	400	8K471169	P488-1	0T4P1		ST-4-1	TM-1	Vert. Discharge
C78	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	" " "
C79	400	500	21R6664	1468-0004	5W5T4		MO.5-34	1FM-34	Sync. Sep. Cath. Byp.
C80	120		21K484150						Voltage Divider
C81	120		21K484150						" " "
C82	1000		21K478410	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Hor. Sync. Coupling
C83	.05	100	8K471166	P288-05	0T2S5		ST-4-05	TM-15	Hor. AFC Plate Bypass
C84	.05	100	8K471166	P488-02	0T2S2		ST-4-02	TM-12	AFC Filter
C85	.25	200	8A471356	P488-25	0T2P25		ST-2-25	TC-2	" " "
C86	250	500	21R6662	1468-00025	5W5T25		MO.5-325	1FM-325	Hor. Osc. Grid Cap.
C87	4000	500	21R6663	1467-002	1W5D2		MW.5-22	1FM-22	Hor. Discharge
C88	.1	600		P683-1	0T6P1		ST-6-1	TM-1	Hor. Osc. Plate Decoup.
C89	470	500	21R6664	1468-0004	5W5T4		MO.5-34	1FM-34	Hor. Coupling ♦
C90	.25	200	8A471356	P488-25	0T4P25		ST-2-25	TC-2	Hor. Output Cath. Byp.
C91	.05	600	8K471167	P688-05	0T6S5		ST-6-05	TM-15	Hor. Output Screen Byp.
C92	7.5		21K470735						AFC Feedback
C93	.03	1000		P1088-03	0T16S3		STM-16-03	TM-13	Damper Filter
C94	.1	600	8A471149	P688-1	0T6P1		ST-6-1	TM-1	Damper Filter
C95	250	1000	21A90013						HV Filter
C96	.25	200	8A471356	P488-25	0T2P25		ST-2-25	TC-2	Pic. Tube Cath. Dec.
C97	1000		21K478410	1468-001			MW.5-21	1FM-21	Filament Bypass

* Used only in models TS-9A and TS-9C
† Used only in models TS-9 and TS-9B
‡ Not used in model TS-9C
§ Used only in model TS-9C
♦ Used only in model TS-9B
Not used in model TS-9
▲ Used only in model TS-9
** Not used in model TS-9B

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	‡	18A489005			Volume control } Dual Concentric
B	1 Meg.	‡				Tone control and switch }
R2A	10K2	‡	18A484072			Contrast control } Dual Concentric
B	100K2	‡				Brightness control }
R3A	1 Meg.	‡	18A484073			Vertical hold control } Dual Concentric
B	30K2	‡				Horizontal hold control }
R4	2 Meg.	‡	18A484199	◁11-139	M-83-S	Vertical size control
R5	5K2	‡	18A484800	◁11-114	M-19-S	Vertical linearity control
R6	1000Ω	4	18K780354		10-1000	Focus control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R7	220Ω	‡	6R6270		Ant. Coil Shunt
R8	390Ω	‡	6R6554		" " "
R9	470Ω	2	6R6377	BTS-470K	RF Grid
R10	18Ω	2	6R476014		RF Plate
R11	82KΩ	‡	6R5575	BTA-82K	RF Screen
R12	470Ω	2	6R6377	BTS-470K	Mixer Grid
R13	470Ω	2	6R6377	BTS-470K	" "
R14	82Ω	‡	6R2119		Mixer Plate Decoupling 20%
R15	15Ω	‡	6R2119		Osc. Grid 20%
R16	820Ω	1	6R5610		Osc. Plate
R17	100Ω	‡	6R6801	BTS-1000	Osc. Plate Decoupling
R18	100Ω	‡	6R6031	BTS-100K	Bias Network See Note 1
R19	820Ω	‡	6R2034	BTS-8200	1st Video IF Grid
R20	68Ω	‡	6R6007		1st Video IF Cathode 20%
R21	22KΩ	‡	6R6397	BTS-22K	1st Video IF Transformer Shunt
R22	1000Ω	‡	6R6801	BTS-1000	Bias Network
R23	1000Ω	‡	6R6801	BTS-1000	" "
R24	1 Meg.	‡	6R6004	BTS-1 Meg.	" " See Note 1 20%
R25	47KΩ	‡	6R6056	BTS-47K	" " " "
R26	68Ω	‡	6R6007		2nd Video IF Cathode 20%
R27	33KΩ	‡	6R6419	BTS-33K	2nd Video IF Transformer Shunt
R28	68Ω	‡	6R6007		3rd Video IF Cathode
R29	470Ω	‡	6R6090		3rd Video IF Transformer Shunt
R30	22Ω	‡	6R6393		4th Video IF Cathode 20%
R31	4700Ω	‡	6R6080	BTS-4700	4th Video IF Plate Decoupling
R32	4700Ω	‡	6R6090	BTS-4700	4th Video IF Decoupling See Note 2
R33	22KΩ	‡	6R6397		4th Video IF Transformer Shunt
R34	4700Ω	‡	6R6090	BTS-4700	Video Det. Load
R35	1.5 Meg.	‡	6R5966	BTS-1.5Meg-5%	Voltage Divider 5%
R36	220KΩ	‡	6R6407	BTS-220K	" "
R37	470KΩ	‡	6R6377	BTS-470K	Bias Filter

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R38	470KΩ	‡	6R6377	BTS-470K	Video Amp. Grid
R39	47Ω	‡	6R2108		Video Amp. Cathode 20%
R40	270Ω	‡			" " "
R41	1 Meg.	‡	6R6004	BTS-1 Meg.	Video Amp. Grid 20%
R42	3300Ω	‡	6R5581	BTS-3300	Video Amp. Plate
R43	3300Ω	2	6R2029	BT-2-3300	" " "
R44	1000Ω	1	6R6327	BTA-1000	" " "
R45	10KΩ	‡	6R6320	BTS-10K	Voltage Divider See Note 3
R46	100KΩ	‡	6R6051	BTS-100K	Voltage Divider See Note 4
R47	100Ω	‡	6R6018		1st Sound IF Cathode See Note 5 20%
R48	1000Ω	‡	6R6301	BTS-1000	1st Sound IF Decoupling See Note 5
R49	100Ω	‡	6R6018		2nd Sound IF Cathode 20%
R50	10KΩ	‡	6R6320		2nd Sound IF Grid See Note 5
R51	3600Ω	‡		BTS-3600	Sound IF Screen See Note 6
R52	100KΩ	‡	6R6031	BTS-100K	Filter See Note 6
R53	5600Ω	‡		BTS-5600	Tone Compensation See Note 6
R54	1000Ω	‡	6R6031		Limiter Grid See Note 7
R55	100Ω	‡	6R6018		Voltage Divider 20%
R56	15KΩ	‡	6R2119		" " See Note 8 20%
R57	10KΩ	‡	6R476060	BTA-10K	" " "
R58	470KΩ	‡	6R6377	BTS-470K	Sound IF Grid See Note 6
R59	10 Meg.	‡		BTS-10 Meg.	Voltage Divider See Note 6
R60	150KΩ	‡	6R6398	BTS-150K	" " "
R61	100KΩ	‡	6R6031	BTS-100K	Disc. Load
R62	100KΩ	‡	6R6031	BTS-100K	" "
R63	100KΩ	‡	6R6031	BTS-100K	De-emphasis
R64	47KΩ	‡		BTS-47K	Tone Compensation See Note 6
R65	33KΩ	‡	6R6410	BTS-330K	Tone Compensation
R66	10 Meg.	‡	6R2109	BTS-10 Meg.	AF Grid 20%
R67	1 Meg.	‡	6R6004	BTS-1 Meg.	AF Plate 20%
R68	125Ω	1	6R6450	BTA-125	Filter
R69	470KΩ	‡	6R6377	BTS-470K	Output Grid See Note 9
R70	270Ω	2	6R488036	2-BT-2-560	Output Cathode See Note 18
R71	1000Ω	2	6R476004	BT-2-1000	Filter See Note 10
R72	100KΩ	‡	6R6031	BTS-100K	Sync. Amp. Grid
R73	1 Meg.	‡	6R6004	BTS-1 Meg.	Limiter Diode Load 20%
R74	33KΩ	2	6R6400	BT-2-330K	Sync. Amp. Plate
R75	68000Ω	‡	6R6428	BTS-6800	Sync. Sep. Cathode
R76	22KΩ	‡	6R6397	BTS-22K	Integrator
R77	62000Ω	‡	6R2004	BTS-6200	"
R78	68000Ω	‡	6R6428	BTS-6800	"
R79	470KΩ	‡	6R6377	BTS-470K	Vert. Osc. Transformer Shunt
R80	1 Meg.	‡	6R6004	BTS-1 Meg.	Vert. Osc. Grid
R81	3.3 Meg.	‡	6R2118	BTS-3.3 Meg.	Voltage Divider
R82	1.5 Meg.	‡	6R5966	BTS-1.5 Meg.	Vert. Osc. Plate See Note 11 20%
R83	220KΩ	‡	6R6407	BTS-220K	Vert. Osc. Decoupling
R84	560Ω	‡	6R6261	BTS-560	Vert. Output Cathode
R85	3.3 Meg.	‡	6R2118	BTS-3.3 Meg.	Vert. Output Grid
R86	1000Ω	‡	6R476004	BTA-1000	Filter
R87	3300Ω	‡	6R5581	BTS-3300	Vert. Peaking
R88	56KΩ	‡	6R6378	BTS-56K	Voltage Divider
R89	33KΩ	‡	6A489166		Voltage Divider Temp. Comp.
R90	560KΩ	‡	6R6697	BTS-560K	Horiz. AFC Grid
R91	8200Ω	‡	6R2004	BTS-8200	Horiz. AFC Filter
R92	180KΩ	‡	6R6444	BTS-180K	Horiz. AFC Cathode
R93	100KΩ	‡	6R6051	BTS-100K	Voltage Divider
R94	100KΩ	‡	6R6031	BTS-100K	Horiz. Osc. Grid
R95	3.3 Meg.	‡	6R2118	BTS-3.3 Meg.	Voltage Divider
R96	150KΩ	‡	6R6398	BTS-150K	Feedback
R97	120KΩ	1	6R5608	BT-1-120K	Horiz. Osc. Plate
R98	10KΩ	‡	6R6320	BTS-10K	Horiz. Osc. Decoupling
R99	47Ω	‡	6R2108		Parasitic Suppressor 20%
R100	1 Meg.	‡	6R6004	BTS-1 Meg.	Horiz. Output Grid 20%
R101	82Ω	2	6R488113		Horiz. Output Cathode
R102	10KΩ	2	6R476060	BT-2-10K	Horiz. Output Screen
R103	560KΩ	‡	6R5697	BTS-560K	Feedback
R104	8200Ω	1		BTS-8200	Horiz. Deflection Coil
R105	3.3Ω	1	17A485412	BW-1-3.3	HV Filaments
R106	820KΩ	1	6R2053		HV Filter
R107A	10000Ω			AB-1000	Voltage Divider
B	15000Ω	25	17A485413	AB-1500	" "
C	7000Ω			AB-7000	" "
R108	22000Ω	‡		BTS-22000	Voltage Divider See Note 14
R109	18000Ω	2	6R3964	BT-2-1800	" "
R110	10000Ω	10		AB-1000	Voltage Divider See Note 12
R111	270Ω	1			Voltage Divider See Note 1
R112	560Ω	2	6R488036	BT-2-560	" " "
R113	68000Ω	2		BT-2-6800	Voltage Divider See Note 15
R114	68000Ω	2		BT-2-6800	" " "
R115	5600Ω	2	6R488036	BT-2-560	Filter See Note 16
R116	560Ω	2	6R488036	BT-2-560	" " "
R117	10Ω	2	6R488144	BW-2-10	Surge Limiter See Note 17
R118	10Ω	2	6R488144	BW-2-10	" " " " " "
R119	10Ω	2	6R488144	BW-2-10	" " " " " "
R120	10Ω	2	6R488144	BW-2-10	" " " " " "
R121	10Ω	2	6R488144	BW-2-10	" " " " " "
R122	10Ω	2	6R488144	BW-2-10	" " " " " "
R123	1 Meg.	‡	6R6004	BTA-1 Meg.	Isolation See Note 17
R124	57Ω	10	17A484810		Line Dropping See Note 17

Note 1. Not used in chassis TS-9.
Note 2. Chassis TS-9 uses 10KΩ resistor in this application.
Note 3. Chassis TS-9 uses 33KΩ resistor in this application.
Note 4. Chassis TS-9 uses 190KΩ resistor in this application.
Note 5. Used in chassis TS-9C only.
Note 6. Used in chassis TS-9B only.
Note 7. Chassis TS-9 uses 2 47KΩ resistor in series in this application.
Note 8. Chassis TS-9B uses 47KΩ resistor in this application.
Note 9. Chassis TS-9 uses 220KΩ resistor in this application.
Note 10. Chassis TS-9 uses 560Ω 2W resistor in this application.
Note 11. Chassis TS-9, TS-9A and TS-9B uses 470KΩ resistor in this application.
Note 12. Chassis TS-9A and TS-9B uses 2-27000Ω and 1-26000Ω resistor in parallel.
Note 13. Chassis TS-9 uses 26000Ω resistor in this application.
Note 14. Chassis TS-9 uses 33000Ω resistor in this application.
Note 15. Used in some chassis TS-9C only.
Note 16. Chassis TS-9 and TS-9B use 100Ω 2W resistor in this application.
Note 17. Used in chassis TS-9 and TS-9B only.
Note 18. Two 560Ω 1W resistors in parallel.

MOTOROLA MODELS VT105, VT105M, VK106, VK106B, VK106M, VT107, VT107M

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1A	117VAC @ 2.1A	730VCT @ 2.23 ADC 460VCT @ .058 ADC	5VAC @ 3A	5VAC @ 2A	††	P-8157	TP-450	
		SEC. 4	SEC. 5	SEC. 6				
T1B	117VAC	5VAC @ 2A	6.3VAC @ 7.0A	6.3VAC @ .6A				

†† Used in chassis TS-9A and TS-9C.
Used in chassis TS-9 and TS-9B.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA MOTOROLA PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA CHICAGO PART No.	REPLACEMENT DATA MERIT PART No.	NOTES
T2	136Ω Tap. @ 97Ω		24B484078				Hor. Osc. Trans.
T3	56Ω	160Ω	24B485416				Vert. Blocking Osc.
T4	430Ω Tap. @ 185Ω	SEC. 1 10.6Ω Tap @ .6Ω SEC. 2 0Ω	25C90052	A-8117	TFB-1		Hor. Output Trans.
T5	540Ω	11Ω		A-8115	TSO-4	A-3035	Vert. Output Trans.
T6A	14Ω		24K485474	DY-1			Hor. Deflection Yoke
B	64Ω						Vert. Deflection Yoke
T7	540Ω		24B84159				Focus coil.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA MOTOROLA PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA CHICAGO PART No.	REPLACEMENT DATA MERIT PART No.	INSTALLATION NOTES
T8	5300Ω	3.5Ω	310Ω	.4Ω	25B489030	A-3849‡‡	RO-9‡‡	A-2930‡‡	‡‡ Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L1	Ant. Coil	0Ω		1X470353		Includes High Freq. and Low Freq. Shunt, Trimmers and antenna receptacle.
L2	Fil. Choke	.1Ω		24A90064		
L3A	1st Video IF	.1Ω				Used in chassis TS-9C only.
B	1st Video IF Trans.			24B489071		Used in chassis TS-9, TS-9A and TS-9B
L4	Fil. Choke	.1Ω		24A90064		
L5	Fil. Choke	.1Ω		24A90064		Used in chassis TS-9C only.
L6	RF Choke	.1Ω		24A90064		
L7	2nd Video IF Trans.	.2Ω	.2Ω	24B489071		
L8	Fil. Choke	.1Ω		24A90064		
L9	RF Choke	.1Ω		24A90064		
L10	3rd Video IF Trans.	.2Ω	.2Ω	24B489071		
L11	RF Choke	.1Ω		24A90064		
L12	4th Video IF Trans. & Sound Take-Off	.2Ω	.2Ω			Sound Take-off is zero resistance.
L13	5th Video IF Trans.	.2Ω	0Ω	24B489075		
L14	Peaking	4.5Ω		24K484137		Wound on 27KΩ resistor.
L15	Sound Trap	2Ω		24B484077		
L16	Peaking	2.2Ω		24K484136		Wound on 1 Meg. resistor.
L17	Peaking	2.2Ω		24K484136		Wound on 1 Meg. resistor.
L18	Peaking	4.5Ω		24K484137		Wound on 27KΩ resistor.
L19	1st Sound IF Coil	.1Ω		24K484082		
L20	2nd Sound IF Coil	.5Ω				Wound on 22KΩ resistor. Used in chassis TS-9C only.
L21	3rd Sound IF Trans.	.1Ω	.1Ω	24B484086		
L22	RF Choke	.1Ω		24A90064		
L23	Disc. Trans	.1Ω	.1Ω	24B471340		
L24	Horiz. size Control	.1Ω		24B90119		
L25	Horiz. Linearity Control	38Ω		24B470796		

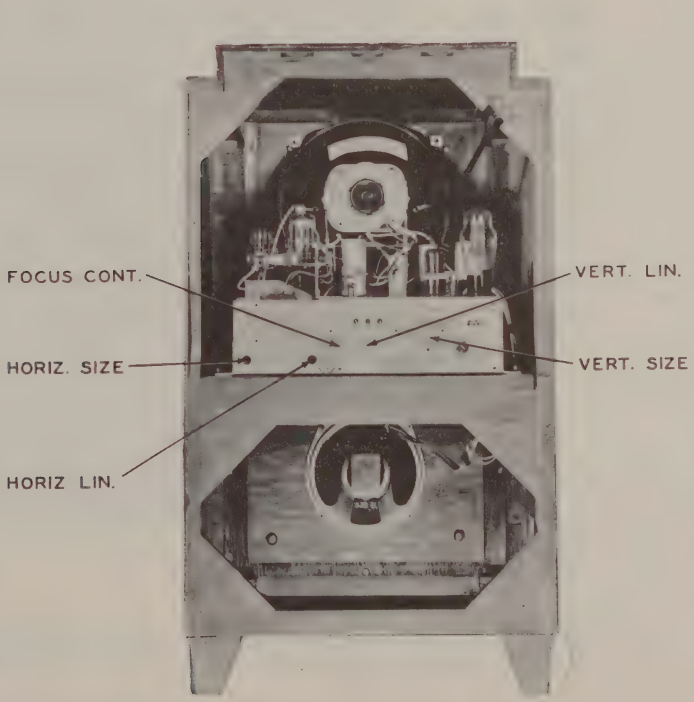
PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATING		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	100Ω	3.5Ω	50B489002		#	# Supplied on request. Specify field resistance and current.
	CONE DIA.	V. C. DIA.				
SP2	7 1/4"	3/4"				

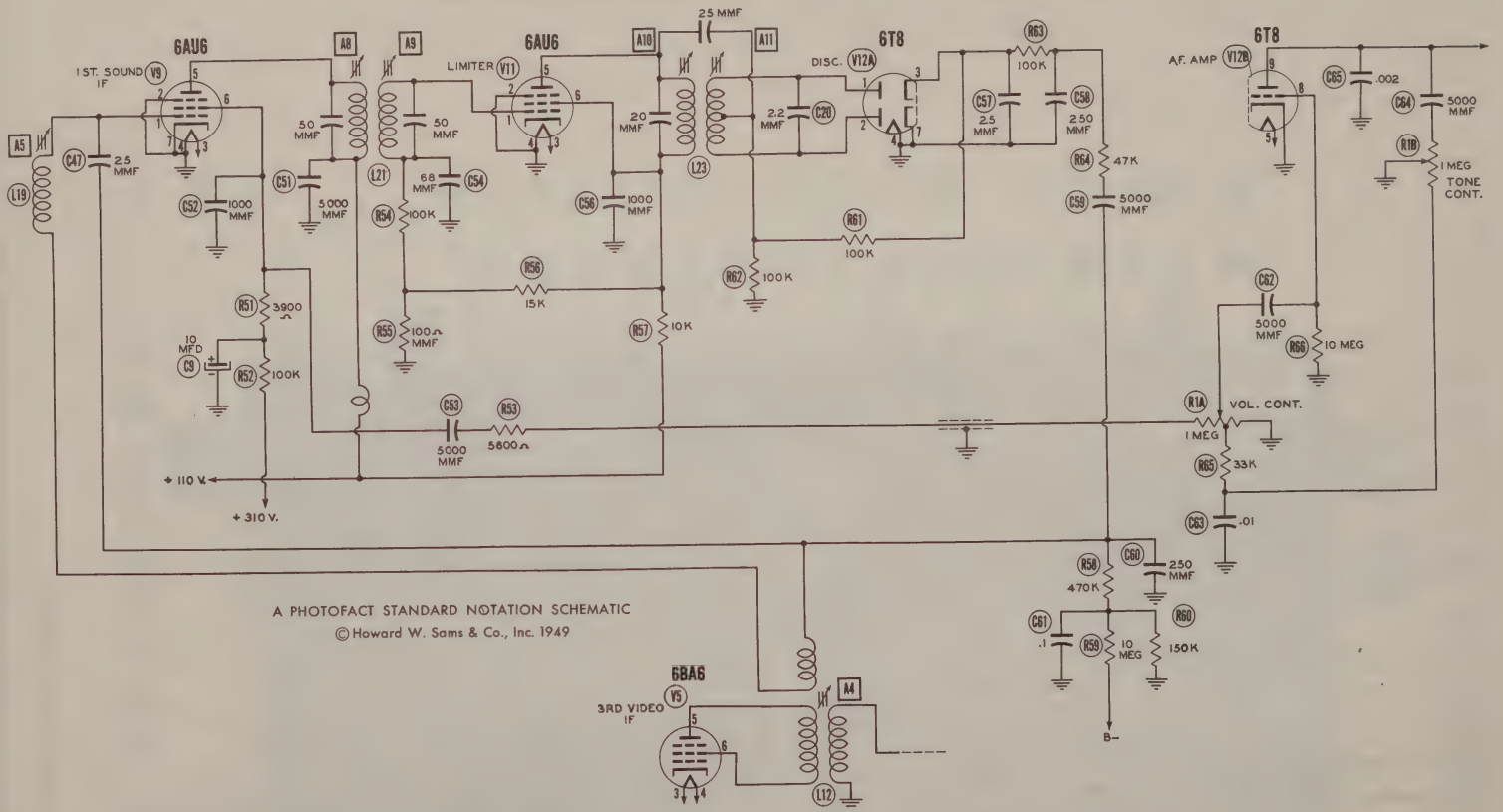
MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M1	Crystal Rect.	48A90173	1N34
M2	Ion Trap	24B484822	Permanent Magnet Type
M3	Tuner	1X484850	TT-3 Complete
M4	Fuse		Type-3AG, 1/8 Amp.
	Iron Core	46K471143	Includes screw for L25 and T-2
	Iron Core	46K471434	Includes screw for L24
	Iron Core	46A70023	Includes screws for L3B, L7, L10, L12, L13, L15, L19.
	Iron Core	46K471337	Includes screws for L23, Pri. and Sec.
	Iron Core	46A484198	Threaded for L21 Pri. and Sec. tuning
	Line Cord Plug	28K471323	Interlock on chassis.
	Socket	9B90116	Picture Tube 12 pin with leads.
	Cabinet	16E484880	VT-105, Table Model Brown Mahogany
	Cabinet	16K484881	VT-105M Table Model Red Mahogany
	Knob	36K485478	Walnut Plastic: Brightness, Horiz. Hold and Off-Tone Control for VT-105, and VT-106.
	Knob	36A485477	Mahogany Plastic: Brightness and Horiz. Hold and Off-Tone Controls for VT-105M.
	Knob	36K485481	Walnut Plastic: Fine Tuning for VT-105 and VT-106.
	Knob	36A485480	Mahogany Plastic: Fine Tuning for VT-105M.
	Knob	36K485490	Walnut Plastic: Contrast and Volume for VT-105 and VT-106.
	Knob	36B485498	Mahogany Plastic: Contrast and Volume for VT-105M.
	Knob	36K485493	Walnut Plastic: Vertical Hold for VT-105 and VT-106.
	Knob	36K485492	Mahogany Plastic: Vertical Hold for VT-105M.
	Knob	36K485487	Walnut Plastic: Channel Selector for VT-105 and VT-106.
	Knob	36B485486	Mahogany Plastic: Channel Selector for VT-105M.
	Plug	28A470122	4 Pin for Antenna Receptacle.
	Window & Gasket Assy.	1X471310	Safety Glass Window with Felt Gasket.



CABINET-REAR VIEW

ALTERNATE SOUND IF CIRCUIT-CHASSIS TS-9B



A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1949

PHOTOFACT* Folder

NATIONAL MODELS
NC-TV7, NC-TV7M, NC-TV7W

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

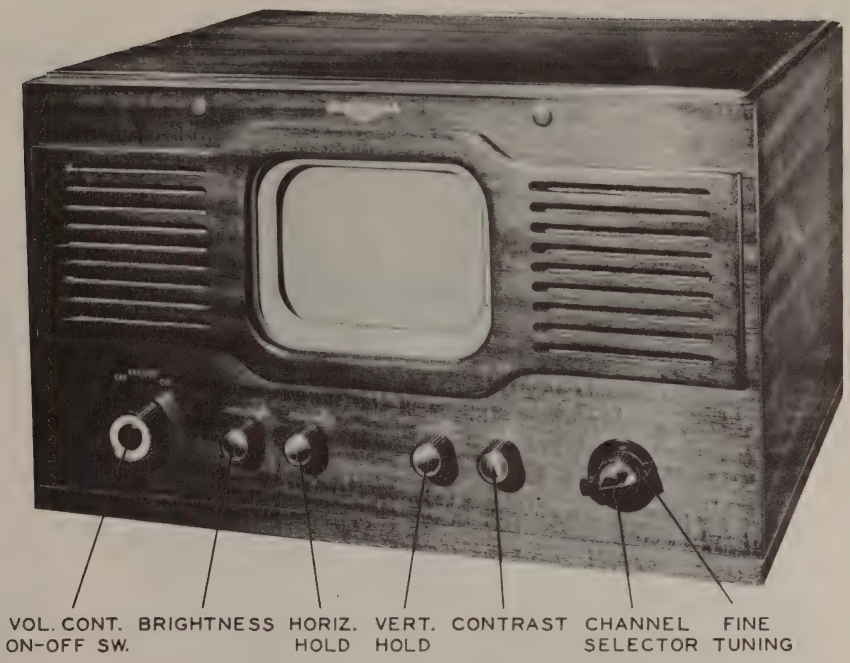
Model NC-TV7W

NATIONAL MODELS
NC-TV7, NC-TV7M, NC-TV7W

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

Date 8/49—No. 4915-14 Set No. 67—Folder No. 14



NATIONAL MODEL NC-TV7W

TRADE NAME	National Models NC-TV7, NC-TV7M, NC-TV7W
MANUFACTURER	National Co., Inc. Malden, Mass.
TYPE SET	Television Receiver
TUBES	Twenty-Two (Early Production), Twenty-One (Late Production)
POWER SUPPLY	117 Volts, 60 Cycles AC — RATING: 1.5 Amps @ 117 Volts
TUNING RANGE—	Channels 2 thru 13. — **SHORT WAVE**

INDEX

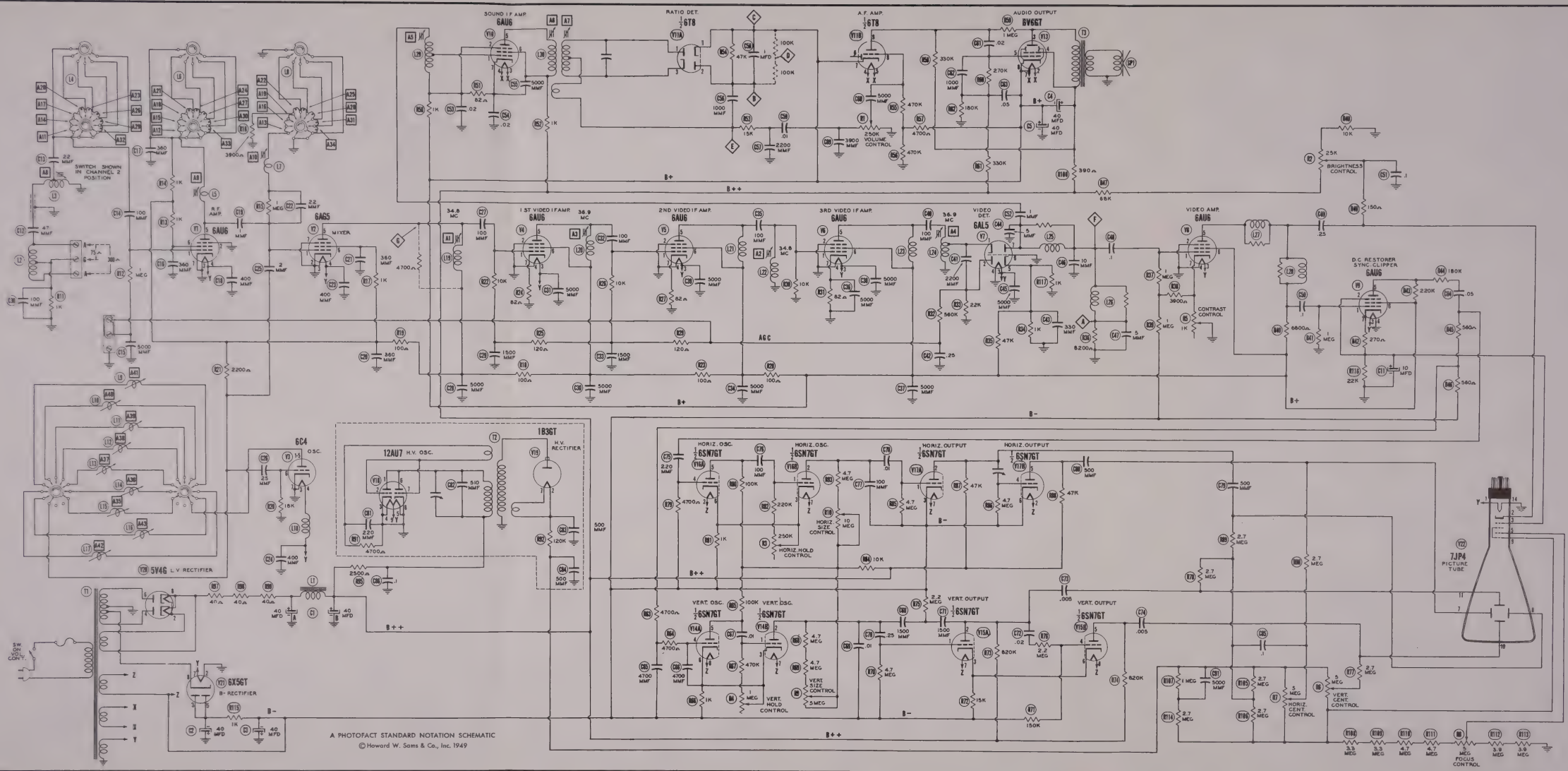
	Page		Page
Alignment Instructions	6,7	Photographs (continued)	
Block Diagram	20	High Voltage Supply	7
Horizontal Linearity and High Voltage Adjustments	19	RF Tuner	10
Parts List and Description	14,15,16	Resistor Identification	12,17
Photographs		Trans., Inductor and Alignment Identification	4,9
Cabinet-Rear View	19	Schematic	2,13
Capacitor Identification	11,18	Tube Placement Chart	5
Chassis-Top View	3	Voltage and Resistance Measurements	8

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 8/49 4915-14 SET #67 FOLDER 14

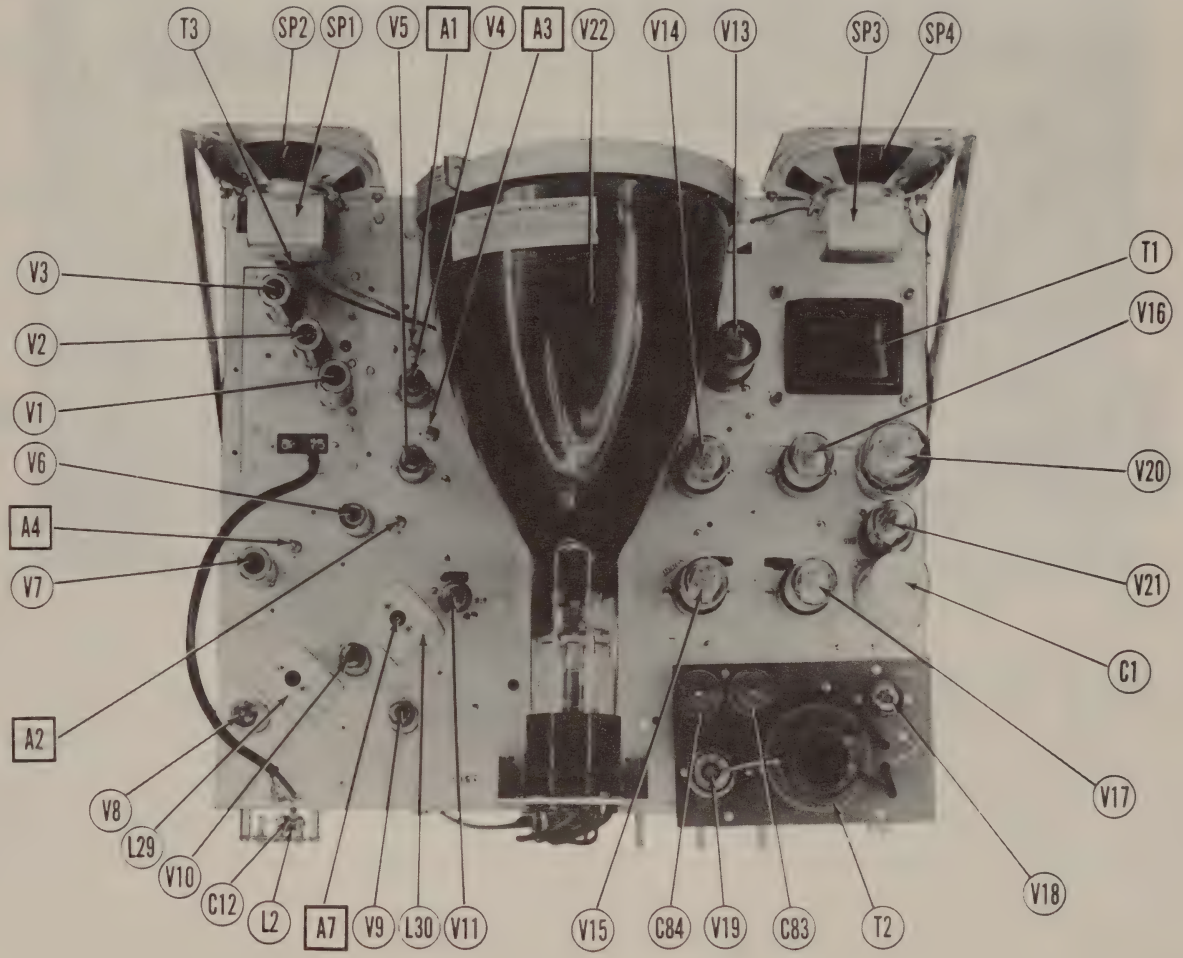
NATIONAL MODELS NC-TV7,
NC-TV7M, NC-TV7W



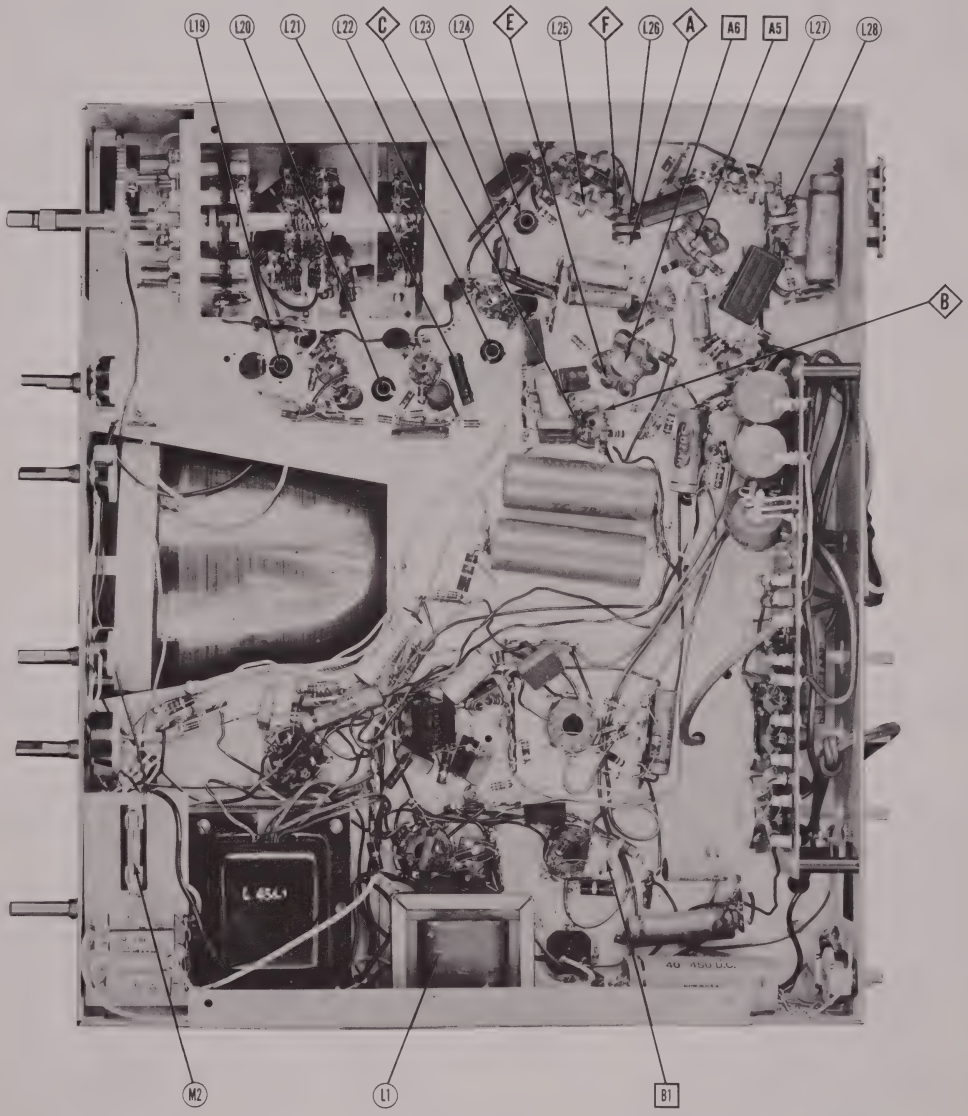
A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1949

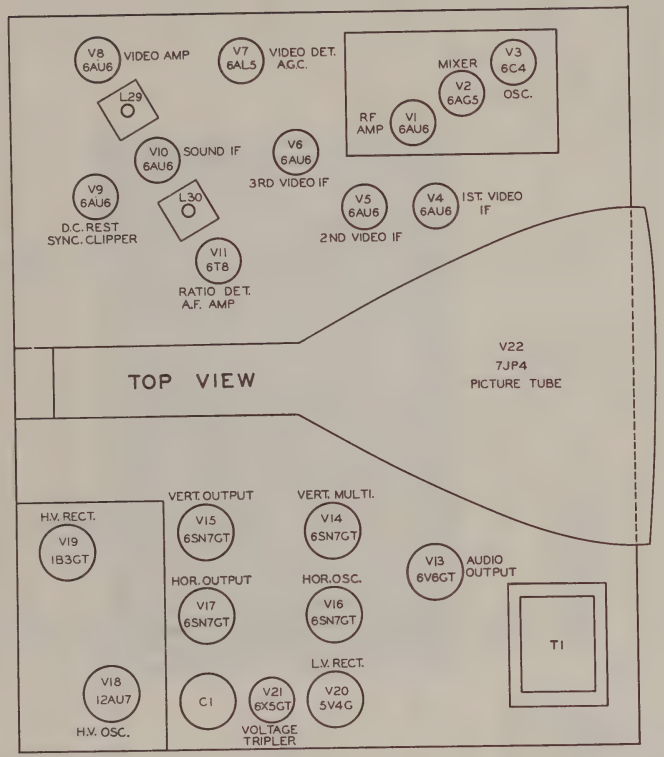
NATIONAL MODELS NC-TV7, NC-TV7M, NC-TV7W

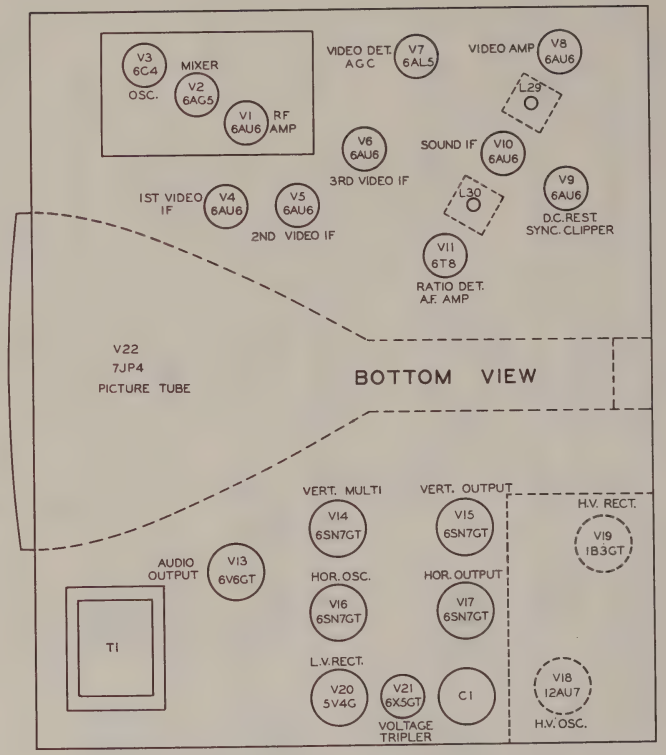


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To disable the high voltage to eliminate shock hazard, disconnect the B+ lead going to the RF high voltage power supply. In those models using a power transformer instead of the series filament string, the high voltage may be disabled simply by removing the high voltage oscillator tube (12AU7-V18).

Some versions of this model use +120 volts for the negative return in various circuits. Care must be exercised not to short out this voltage directly to chassis or indirectly through the test equipment ground leads.

VIDEO IF ALIGNMENT

Remove the local oscillator tube (6C4-V3). If receiver incorporates a series filament string, connect a jumper across pins 3 and 4 of the oscillator tube socket.

Connect a 2 volt supply from the AGC line to chassis. Negative to junction of R29 and C33, positive to chassis.

If the receiver at hand has an AGC link on the rear apron of the chassis, connect the link between the center and chassis terminals.

To inject the signal into the video IF channel, connect the signal generator to a "floating" tube shield over the mixer tube (V2). Connect the low side of the signal generator to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.		High side to an ungrounded tube shield placed over mixer tube (V2). Low side to chassis.	34.8MC	Any	DC Probe to Point (A) Common to chassis.	A1, A2	Adjust for maximum deflection.
2.		"	36.9MC	"	"	A3, A4	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal amplifier of the oscillscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.		High side to ungrounded tube shield placed over mixer tube (V2). Low side to chassis	35MC (10MC Sweep)	34.8MC 36.9MC	Any	Vert. Amp. to Point (A) Low side to chassis.		If necessary, slightly retouch A1, A2, A3 and A4 for response curve and placement of markers as per Fig 1.

SOUND IF ALIGNMENT

Connect two matched 100KΩ (± 5%) resistors in series from alignment Points (B) to (C). The junction of these two resistors is alignment point (D) as shown on the schematic diagram.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	.01MFD	High side to Point F. Low side to chassis.	4.5MC (Very Accurately)	Any	DC Probe to Point (B) Common to Point (C)	A5, A6	Adjust for maximum deflection.
5.	.01MFD	"	"	"	DC Probe to Point (D) Common to Point (E)	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

RF ALIGNMENT

Disconnect the blue mixer plate lead and connect it through a 4700Ω carbon resistor to the junction of R18 and C28 (B+).

It should be noted that both the RF amplifier lines and the oscillator circuits of the high band channels are aligned for either the odd numbered channels (13, 11, and 9) or the even numbered channels (12, 10 and 8). Do not intermix the alignment of both odd and even numbered channels.

On those models not incorporating a tuned antenna coil (L4), disregard the alignment adjustments A8, A11, A14, A17, A20, A23, A26, A29 and A32.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6A	Two 125Ω carbon res.	Across antenna terminals with 125Ω resistor in each generator lead.	213MC (12MC Sweep)	211.25MC 215.75MC	13	Vert. Amp. to Point (C) Low side to chassis.	A8, A9, A10	Adjust for maximum amplitude and wave form similar to Fig 2.
B.	"	"	207MC (12MC Sweep)	205.25MC 209.75MC	12	"	A8, A9, A10	"
7A.	"	"	201MC (12MC Sweep)	199.25MC 203.75MC	11	"	A11, A12, A13	"
B.	"	"	195MC (12MC Sweep)	193.25MC 197.75MC	10	"	A11, A12, A13	"
8A.	"	"	189MC (12MC Sweep)	187.25MC 191.75MC	9	"	A14, A15, A16	"
B.	"	"	183MC (12MC Sweep)	181.25MC 185.75MC	8	"	A14, A15, A16	"
9.	"		177MC (12MC Sweep)	175.25MC 179.75MC	7	"	A17, A18, A19	"
10.	"	"	85MC (12MC Sweep)	83.25MC 87.75MC	6	"	A20, A21, A22	"
11.	"	"	79MC (12MC Sweep)	77.25MC 81.75MC	5	"	A23, A24, A25	"
12.	"	"	69MC (12MC Sweep)	67.25MC 71.75MC	4	"	A26, A27, A28	"
13.	"	"	63MC (12MC Sweep)	61.25MC 65.75MC	3	"	A29, A30, A31	"
14.	"	"	57MC (12MC Sweep)	55.25MC 59.75MC	2	"	A32, A33, A34	"

ALIGNMENT INSTRUCTIONS (CONT.)

OSCILLATOR ALIGNMENT

As outlined under RF amplifier alignment, do not align intermixed the odd and even numbered channels on the high band. Align either the odd or the even numbered channels, depending upon the locality in which the receiver is to be used.

Replace the 6C4 oscillator tube and reconnect the mixer plate lead to its original connection. Be sure to remove the temporary plate load of 4700Ω.

Connect a .01MFD capacitor from pin 5 of the video amplifier (V8) to the grid of the 1st audio amplifier (either 6AT6 or 6T8).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
15.	Two125Ω carbon res.	Across antenna terminals with 125Ω resistor in each generator lead.	92.55MC	2		A35	Adjust for rough audio beat note in speaker.
16.	"	"	98.55MC	3		A36	"
17.	"	"	104.55MC	4		A37	"
18.	"	"	114.55MC	5		A38	"
19.	"	"	120.55MC	6		A39	"
20.	"	"	141.25MC	7		A40	"
21A.	"	"	147.25MC	8		A41	"
B.	"	"	153.25MC	9		A41	"
22A.	"	"	159.25MC	10		A42	"
B.	"	"	165.25MC	11		A42	"
23A.	"	"	171.25MC	12		A43	"
B.	"	"	177.25MC	13		A43	"

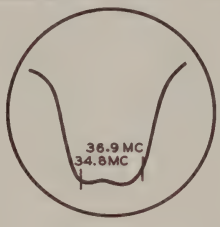
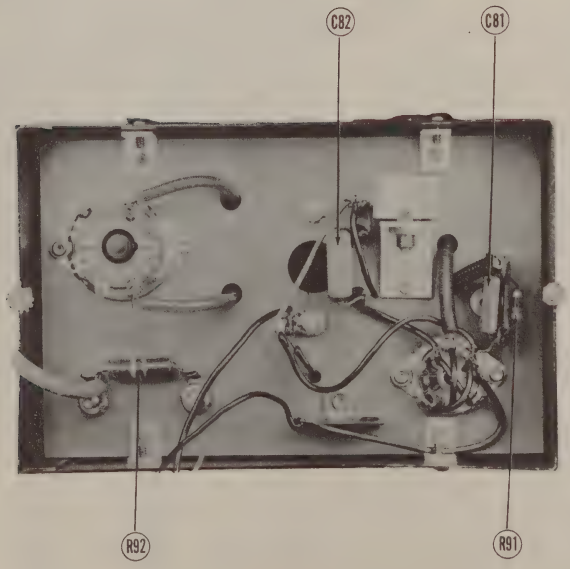


FIG. 1.

FIG. 2



HIGH VOLTAGE SUPPLY - BOTTOM VIEW

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AU6	-.4VDC	0V	0V	6.3VAC	135VDC	135VDC	0V		
V 2	6AG5	-1.5VDC	0V	0V	6.3VAC	140VDC	135VDC	0V		
V 3	6C4	100VDC	0V	0V	6.3VAC	100VDC	§-3VDC	0V		
V 4	6AU6	-.2VDC	0V	6.3VAC	0V	142VDC	142VDC	.8VDC		
V 5	6AU6	-.2VDC	0V	6.3VAC	0V	145VDC	145VDC	.5VDC		
V 6	6AU6	0V	0V	6.3VAC	0V	150VDC	150VDC	.8VDC		
V 7	6AL5	0V	0V	6.3VAC	0V	1.5VDC	0V	-1VDC		
V 8	6AU6	.4VDC	0V	6.3VAC	0V	105VDC	155VDC	9VDC		
V 9	6AU6	.2VDC	6VDC	6.3VAC	0V	105VDC	155VDC	6VDC		
V 10	6AU6	†16.5VDC	†16.5VDC	†0V	†6.3VAC	†250VDC	†250VDC	†18.5VDC		
V 11	6T8	†-.8VDC	†-1.2VDC	†-.8VDC	†6.3VAC	†0V	†-.8VDC	†0V	†-.7VDC	†115VDC
V 13	6V6GT	†0V	†6.3VAC	†235VDC	†250VDC	†-7.2VDC	†235VDC	†0V	†0V	
V 14	6SN7GT	♦1.6VDC	♦20VDC ♦37.5VDC	♦10VDC	♦0V	♦340VDC	♦10VDC	♦0V	♦6.3VAC	
V 15	6SN7GT	♦0V	♦250VDC	♦15VDC	♦0V	♦250VDC	♦15VDC	♦0V	♦6.3VAC	
V 16	6SN7GT	♦1.7VDC	♦15.5VDC ♦29VDC	♦3.8VDC	♦0V	♦145VDC	♦3.8VDC	♦0V	♦6.3VAC	
V 17	6SN7GT	♦-7.8VDC	♦320VDC	♦0V	♦-5.5VDC	♦400VDC	♦0V	♦0V	♦6.3VAC	
V 18	12AU7	260VDC	-42VDC	0V	0V	0V	260VDC	-42VDC	0V	6.3VAC
V 19	1B3GT	* DO NOT MEASURE								
V 20	5V4G	0V	450VDC	0V	420VAC	0V	420VAC	0V	450VDC	
V 21	6X5GT	0V	0V	-260VDC	0V	-260VDC	0V	6.3VAC	220VAC	

PINS		1	2	3	4	5	6	7	8	9	10	11	14
V22	7JP4	6.3VAC	135VDC	6VDC	0V	*	0V	*	*	*	*	*	0V

RESISTANCE READINGS

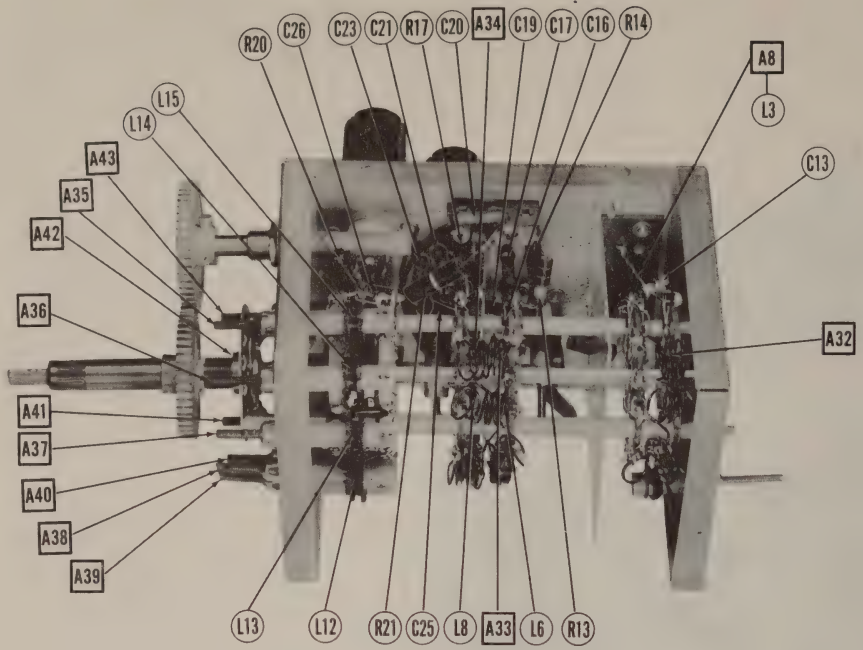
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AU6	1.6 Meg.	0Ω	0Ω	.1Ω	†1.4KΩ	†1.4KΩ	0Ω		
V 2	6AG5	1 Meg.	0Ω	0Ω	.1Ω	†300Ω	†1.4KΩ	0Ω		
V 3	6C4	†2.6KΩ	Inf.	0Ω	.1Ω	†2.6KΩ	18KΩ	0Ω		
V 4	6AU6	600KΩ	0Ω	.1Ω	0Ω	†200Ω	†200Ω	82Ω		
V 5	6AU6	600KΩ	0Ω	.1Ω	0Ω	†100Ω	†100Ω	82Ω		
V 6	6AU6	.1Ω	0Ω	.1Ω	0Ω	†1.4Ω	†0Ω	82Ω		
V 7	6AL5	.1Ω	22KΩ	.1Ω	0Ω	†47KΩ	0Ω	8KΩ		
V 8	6AU6	1 Meg.	0Ω	.1Ω	0Ω	†6.8KΩ	†0Ω	1000Ω		
V 9	6AU6	1 Meg.	22KΩ	.1Ω	0Ω	†220KΩ	†0Ω	22.5KΩ		
V 10	6AU6	†1000Ω	†1000Ω	†0Ω	†.1Ω	♯1000Ω	♯1000Ω	†1.1KΩ		
V 11	6T8	Inf.	†47KΩ	Inf.	†.1Ω	†0Ω	Inf.	†0Ω	†475KΩ	♯260KΩ
V 13	6V6GT	Inf.	†.1Ω	♯900Ω	♯600Ω	450KΩ	♯900Ω	†0Ω	†0Ω	
V 14	6SN7GT	♦600KΩ	♯9.4Meg. ♯14.4Meg.	♦1000Ω	♦10KΩ	♯110KΩ	♦1000Ω	♦0Ω	♦.1Ω	
V 15	6SN7GT	♦4.7 Meg	♯850KΩ	♦15KΩ	♦150KΩ	♯850KΩ	♦15KΩ	♦0Ω	♦.1Ω	
V 16	6SN7GT	♦250KΩ	♯4.7Meg. ♯10 Meg.	♦1000Ω	♦5KΩ	♯100KΩ	♦1000Ω	♦0Ω	♦.1Ω	
V 17	6SN7GT	♦4.7 Meg	♯55KΩ	♦0Ω	♦4.7Meg	♯48KΩ	♦0Ω	♦0Ω	♦.1Ω	
V 18	12AU7	♯3KΩ	5KΩ	0Ω	0Ω	0Ω	♯3KΩ	5KΩ	0Ω	.1Ω
V 19	1B3GT	Inf.	30 Meg.	Inf.	Inf.	Inf.	Inf.	30 Meg.	Inf.	TOP CAP 150Ω
V 20	5V4G	Inf.	40KΩ	Inf.	115Ω	Inf.	110Ω	Inf.	40KΩ	
V 21	6X5GT	Inf.	0Ω	90KΩ	Inf.	90KΩ	Inf.	.1Ω	60Ω	

PINS		1	2	3	4	5	6	7	8	9	10	11	14
V22	7JP4	.1Ω	♯18KΩ	22KΩ	Inf.	12 Meg.	Inf.	33 Meg.	33 Meg.	33 Meg.	32 Meg.	33 Meg.	0Ω

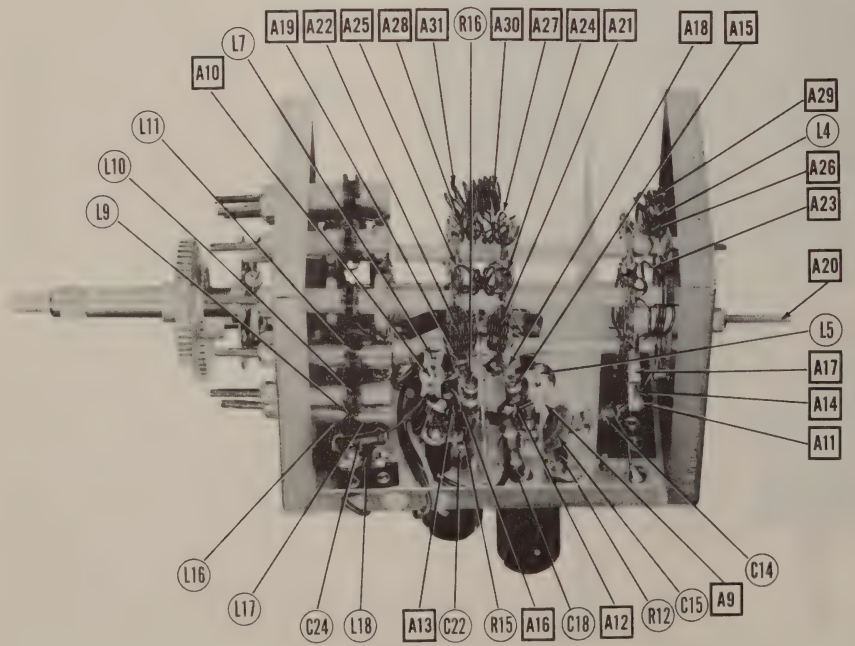
* Do Not Measure
† Measured from pin 8 of V13
♦ Measured from pin 3 of V17
§ Taken with vacuum tube voltmeter.

† Measured from pin 8 of V13
♯ Measured from pin 8 of V20
♦ Measured from pin 3 of V17

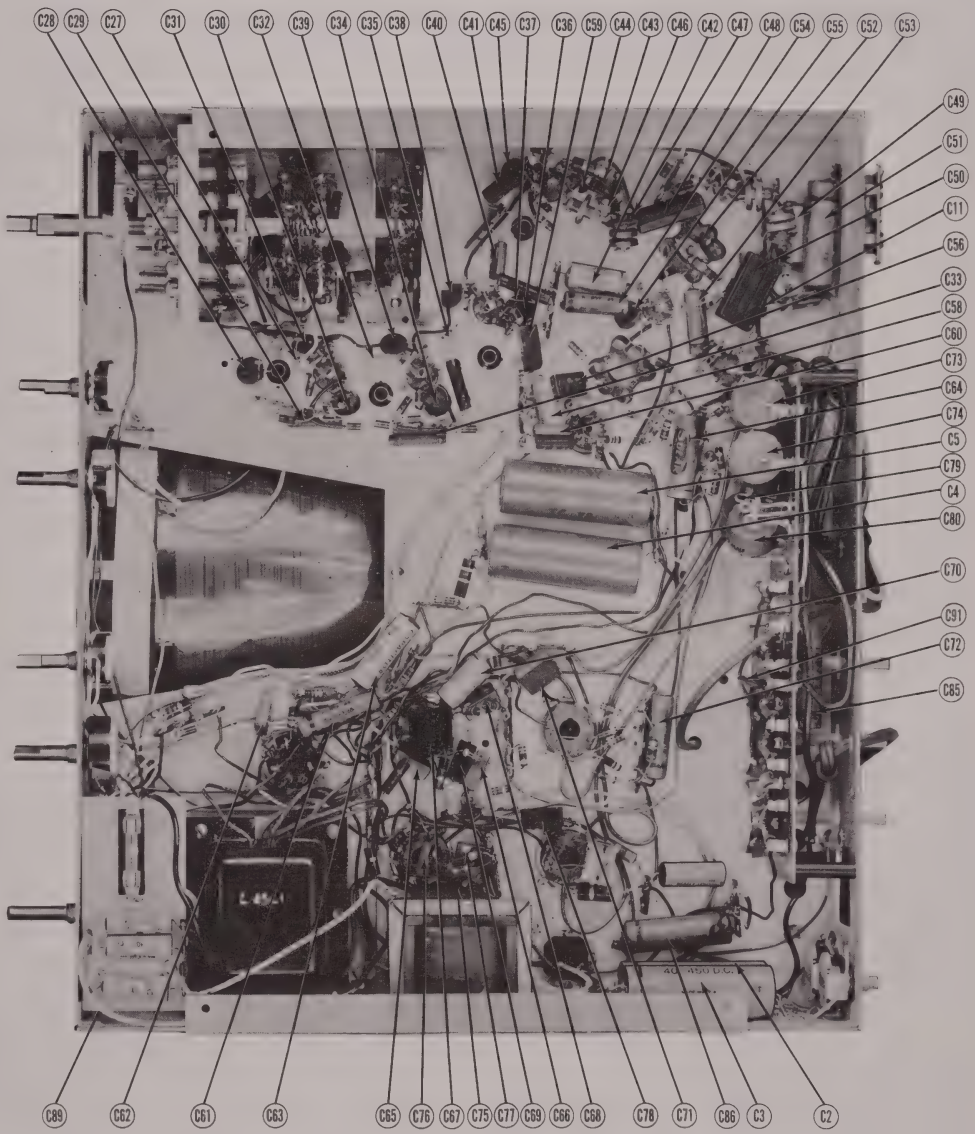
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



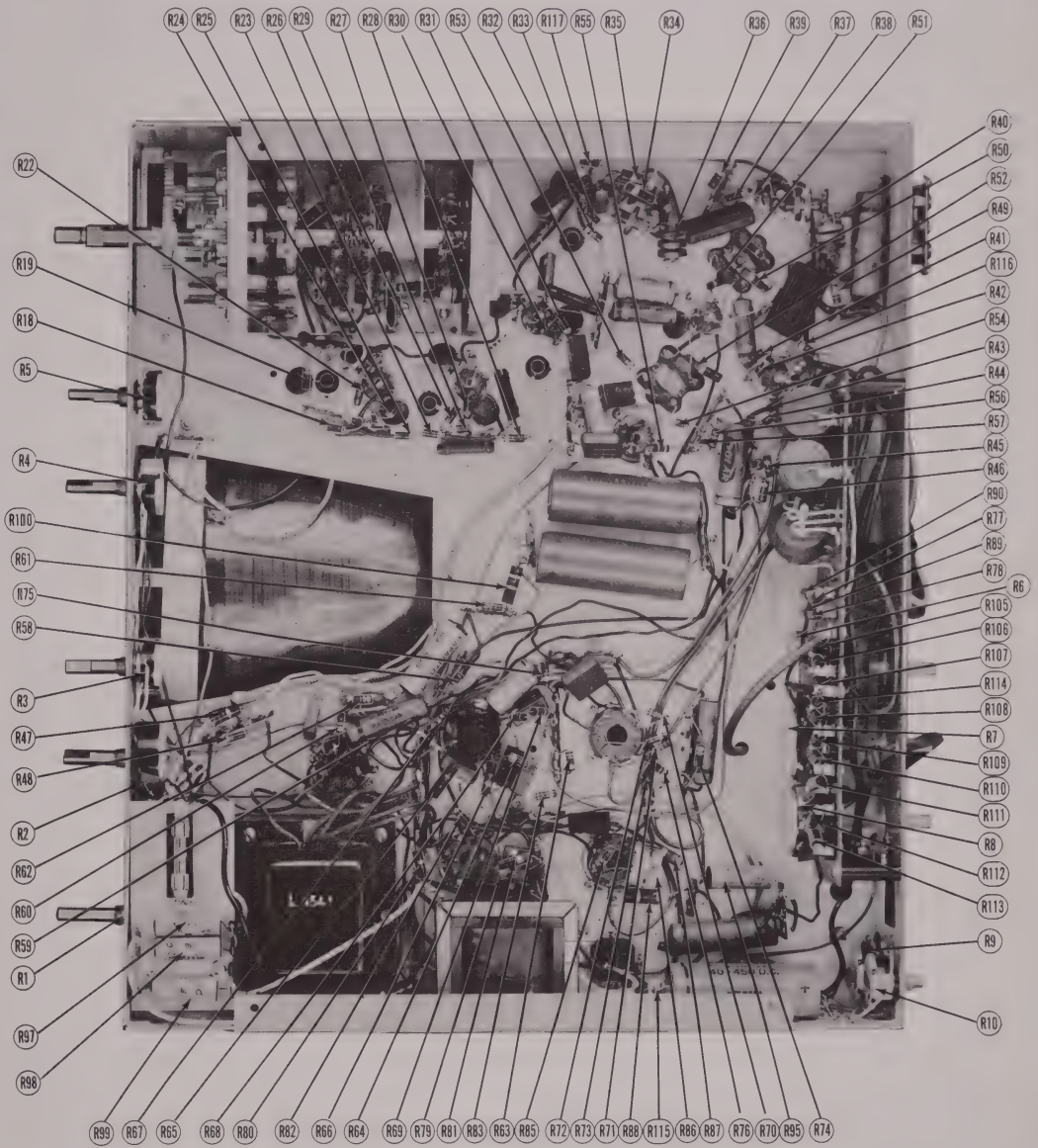
RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

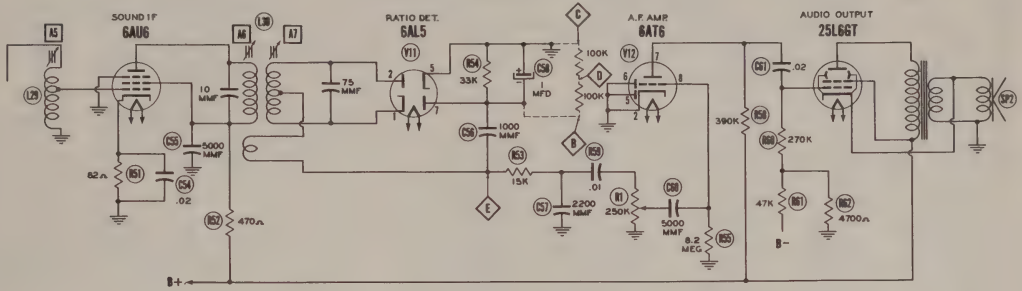


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

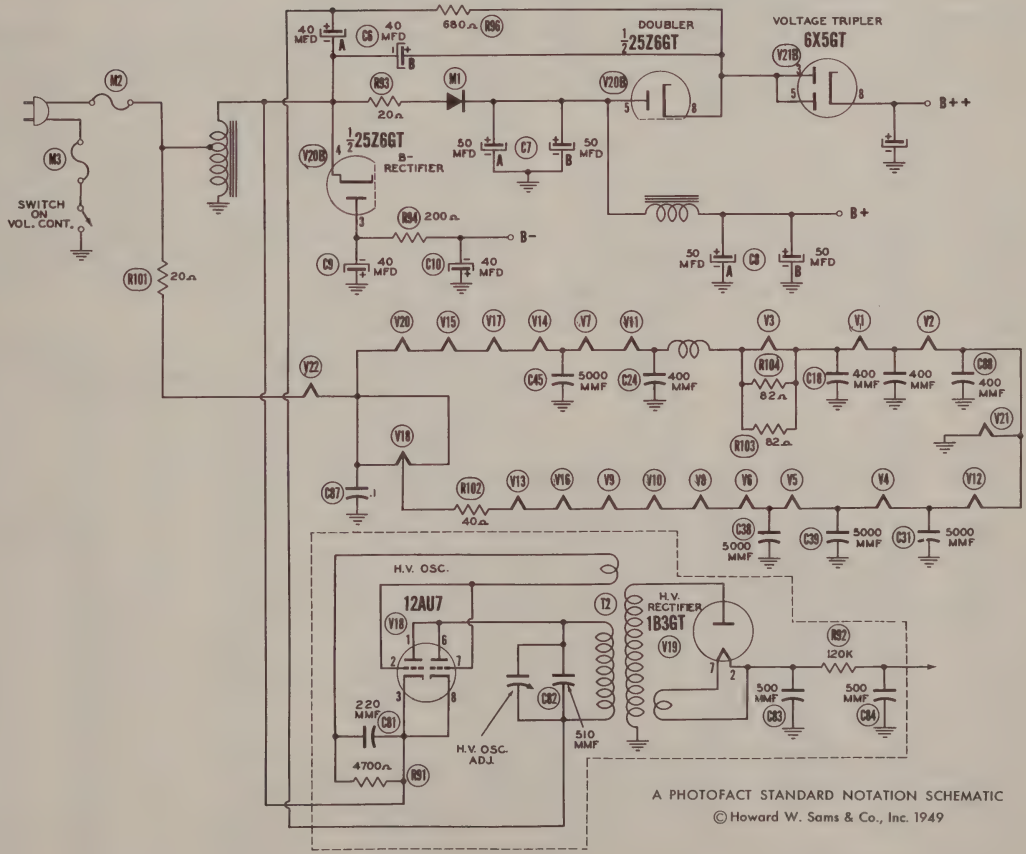


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ALTERNATE SOUND IF CIRCUIT



ALTERNATE POWER SUPPLY CIRCUIT



A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1949

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6AU6	6AU6	7BK	
V2	Mixer	6AJ8	6AJ8	7D0	
V3	Osc-Limiter	6C4	6BQ	7AF	
V4	1st Video IF Amp	6AU6	6AU6	7BK	
V5	2nd Video IF Amp	6AU6	6AU6	7BK	
V6	3rd Video IF Amp	6AU6	6AU6	7BK	
V7	Video Det.& AGC	6AL5	6AL5	6BT	
V8	Video Amp.	6AU6	6AU6	7BK	
V9	DC Restorer-Sync. Stripper	6AU6	6AU6	7BK	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11A	Ratio Det.-AF Amp.	6T8	6T8	9E	Used in late production.
B	Ratio Det.	6AL5	6AL5	6BT	Used in early production.
V12	AF Amp.	6AT6	6AT6	7BT	Used in early production.
V13A	Audio Output	6V6GT	7AC		Used in early production.
B	Audio Output	25L6GT	25L6GT	7AC	Used in early production.
V14A	Vert. Osc.	6SN7GT	6SN7GT	8BD	Used in late production.
B	Vert. Osc.	12SN7GT	12SN7GT	8BD	Used in early production.
V15A	Vert. Output	6SN7GT	6SN7GT	8BD	Used in early production.
B	Vert. Output	12SN7GT	12SN7GT	8BD	Used in early production.
V16A	Hor. Osc.	6SN7GT	6SN7GT	8BD	Used in late production.
B	Hor. Osc.	12SN7GT	12SN7GT	8BD	Used in early production.
V17A	Hor. Output	6SN7GT	6SN7GT	8BD	Used in late production.
B	Hor. Output	12SN7GT	12SN7GT	8BD	Used in early production.
V18	HV Osc.	12AU7	12AU7	9A	
V19	HV Rectifier	1B3GT	1B3GT	3G	
V20A	LV Rectifier	5V4G	5V4G	5L	Used in late production.
B	B Minus Rect.-Doubler	25Z6GT	25Z6GT	7Q	Used in early production.
V21A	B Minus Rect.	6X5GT	6X5GT	6S	Used in late production.
B	Voltage Tripler	6X5GT	6X5GT	6S	
V22	Picture Tube	70P4	70P4	14G	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	K498-1	AF88J	UP4445			TVL-64	■ Filter
B	40	450							■ Filter
C2	40	450	E338-17	PRS450/40	BR4045			TVA-24	Filter †
C3	40	450	E338-17	PRS450/40	BR4045			TVA-24	" †
C4	40	450		PRS450/40	BR4045			TVA-24	" †
C5	40	450		PRS450/40	BR4045			TVA-24	" †
C6A	40	450	K945-2						
B	40	450							Voltage Doubler
C7A	50	200	K944-2						Filter *
B	50	200							" *
C8A	50	200	K944-2						" *
B	50	200							" *
C9	50	25	E338-5						" *
C10	40	200	E338-5						" *
C11	10	25	E338-12	PRS25/10	BBR10-25			TVA-14	DC Res. Cath. Bypass
C12	.05		J665-18	SM05		GP1K-50	MD.5-45	DFM-45	RF Coupling
C13	22		D625D-410			GP1K-25			" "
C14	100		F913-2			N750L-100			
C15	300		K946-1						AGC Filter
C16	360		K941-1			GP2K-500			RF Screen Bypass
C17	360		K941-1			GP2K-500			RF Plate Dec.
C18	400		K941-2			GP2K-500			RF Fil. Bypass
C19	1		L081-4						RF Coupling
C20	360		K941-2			GP2K-500			Decoupling
C21	360		K941-1			GP2K-500			Mixer Screen Bypass
C22	22		F912-10			GP1K-25			RF Coupling
C23	400		K941-2			GP2K-500			Mixer Fil. Bypass
C24	400		K941-2			GP2K-500			Fil. Bypass
C25	2		F912-5						Osc. Coupling
C26	25		F913-11			GP1K-25			Osc. Grid Cap.
C27	100		K375-3			GP1K-100			IF Coupling
C28	5000		K946-1						Mixer Plate Dec.
C29	1500		K942-1			GP2L-0015	MM.5-25	LFM-25	AGC Filter
C30	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	1st V. IF Decoupling
C31	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	1st V. IF Fil. Bypass
C32	100		K375-3	1468-0001	5W5T1	GP1K-100	MD.5-31	LFM-31	IF Decoupling
C33	1500		K942-1	1467-0015	1W5D15	GP2L-0015	MM.5-215	DFM-215	AGC Filter
C34	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	2nd V. IF Decoupling
C35	100		K375-3	1468-0001	5W5T1	GP1K-100	MD.5-31	LFM-31	IF Coupling
C36	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	3rd V. IF Cath. Bypass
C37	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	3rd V. IF Decoupling
C38	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	3rd V. IF Fil. Bypass
C39	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	2nd V. IF Fil. Bypass
C40	100	500	J665-32	1468-0001	5W5T1	GP1K-100	MD.5-31	LFM-31	IF Coupling
C41	2200	500	J666-26	1467-002	1W5D2	GP2M-002	MM.5-22	LFM-22	" "
C42	25	400	K858-2		GT4P25		ST-4-25	TC-4	AGC Filter
C43	330	500	J665-50	1468-0003	5W5T3	GP2K-300	MD.5-33	LFM-335	RF Bypass
C44	5		D625D-401	1468-000005	5W5T5	NP0K-5	MD.5-55	LFM-55	V. Diode Filter
C45	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	V. Det.-AGC Fil. Byp.
C46	10		D625D-402	1468-00001	5W5Q1	GP1K-10	MD.5-41	MB-41	V. Diode Filter
C47	5		D625D-401	1468-000005	5W5T5	NP0K-5	MD.5-55	LFM-55	" " "
C48	.1	400	D827-11	P488-1		GT4P1	ST-4-1	TM-1	Video Coupling
C49	.25	400	K934-1	P488-25		GT4P25	ST-4-25	TC-2	" "
C50	.1	400	D827-11	P488-1		GT4P1	ST-4-1	TM-1	" "
C51	.1	400	D827-11	P488-1		GT4P1	ST-4-1	TM-1	Pic. Tube Cath. Dec.
C52	1		L081-4	1468-00001					S. IF Coupling
C53	.02	400	D827-43	P488-02		GT4S2	ST-4-02	TM-12	S. IF Decoupling †
C54	.02	400	D827-43	P488-02		GT4S2	ST-4-02	TM-12	S. IF Cath. Bypass
C55	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	S. IF Decoupling
C56	1000	500		1468-001	1W5D1	GP2L-001	MM.5-21	LFM-21	Diode Load Cap.
C57	2200	500	J666-26	1467-002	1W5D2	GP2M-002	MM.5-22	LFM-22	De-emphasis *
C58	100		K934-1		GT2M1		ST-2-1M		Stabilizing Gap.
C59	.01	600	D827-7	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C60	5000	500		1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	" "
C61	.02	600		P688-02	GT6S2		ST-6-02	TM-12	" "

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C62	1000	500		1468-001	1W5D1	GP2L-001	MM.5-21	LFM-21	Output Grid Bypass †
C63	.05	600	D827-3	P688-05	GT6S5		ST-6-05	TM-15	Bias Filter †
C64	.05	600	D827-3	P688-05	GT6S5		ST-6-05	TM-15	Sync. Coupling
C65	4700	500	J666-40						Integrator Net.
C66	4700	500	J666-40						" "
C67	.01	600	D827-7	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Vert. Osc. Feedback
C68	1000	500	J666-64						Vert. Discharge
C69	.01	600	D827-7	P688-01	GT6S1		ST-6-01	TM-11	Vert. Discharge
C70	.25	400	K934-1	P488-25	GT4P25		ST-4-25	TC-2	Vert. Coupling
C71	3300	500	J666-54						Vert. Sweep Feedback
C72	.02	400	D827-44	P488-02	GT4S2		ST-4-02	TM-12	Vert. Sweep Coupling
C73	.005	5000	D827-45	5084-005	D5TH-50D5		STM-60-006	TVH-256	Vert. Sweep Coupling
C74	.005	5000	D827-45	5084-005	D5TH-50D5		STM-60-005	TVH-256	" " "
C75	220	500	J665-44						Sync. Coupling
C76	100	500	J665-32	1468-0001	5W5T1	GP1K-100	MD.5-31	LFM-31	Hor. Osc. Feedback
C77	100	500	J665-32	1468-0001	5W5T1	GP1K-100	MD.5-31	LFM-31	Hor. Discharge
C78	.01	600	D827-7	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Hor. Coupling
C79	500	10000	K891-1	10084-0005	D5TH-60T5	410-500	STM-60-0006	TVH-356	Hor. Sweep Coupling
C80	500	10000	K891-1	10084-0005	D5TH-60T5	410-500	STM-60-0006	TVH-356	" " "
C81	220	500	J665-44						HV Osc. Grid Cap.
C82	510	500	J666-3						Fixed Trimmer
C83	500	10000	K891-2			410-500			HV Filter
C84	500	10000	K891-2			410-500			" "
C85	.1	600	D827-13	P688-1	GT6P1		ST-6-1	TM-1	Hor. Cent. Cont. Bypass
C86	.1	600	D827-13	P688-1	GT6P1		ST-6-1	TM-1	HV Osc. Plate Dec. †
C87	.1	400	D827-11	P488-1	G74P1		ST-4-1	TM-1	HV Osc. Fil. Bypass *
C88	400		K941-2	1468-0004	5W5T4	GP2K-500	MD.5-34	LFM-34	Mixer Fil. Bypass *
C89	3900	500		1467-004	1D5D4		MM.5-24	LFM-24	De-emphasis †
C90	100	500	J665-32	1468-0001	5W5T1	GP1K-100	MD.5-31	LFM-31	RF Bypass *
C91	5000		K946-1	1467-005	1D5D5	GP2M-005	MM.5-25	LFM-25	" " †

* Used in early production only.
† Used in late production only.
‡ Not used in all models.

CONTROLS

ITEM No.	RATING: RESIST-ANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	K347-2	Q13-137	M-63-2	Volume control (Early Production)
B	Switch		Not Req.	76-1	SW-A	Attach to R1A Per instructions.
R1A	250KΩ	½		Q13-130	M-64-2	Volume control (Late Production)
B	Switch			76-1	SW-A	Attach R1A Per instructions.
R2	25KΩ	½	K915-6	Q11-120	M-42-S	Brightness control
R3	250KΩ	½	K915-2	Q11-130	M-55-S	Horiz. hold control
R4	1 Meg.	½	K915-3	Q11-137	M-61-S	Vert. hold control
R5	10000Ω	½	L100-1	Q11-108	M-8-S	Contrast control
R6	5 Meg.	½	L100-1	Q11-141, C5#		Vert. centering control
R7	5 Meg.	½	L100-1	Q11-141, C5#		Horiz. centering control
R8	5 Meg.	½	L100-1	Q11-141, C5#		Focus control
R9	5 Meg.	½	K915-4	Q11-141		Vert. size control
R10	10 Meg.	½	K915-5	Q11-143		Horiz. size control

Use an extra nut as a spacer to hold control back from control sub-panel as far as possible. Then saw off shaft of new control so that C5 coupler can be employed to connect part of original shaft, (insulated shaft) to the new control. (CAUTION: Be sure that C5 coupler has plenty of clearance between itself and chassis.)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	IRC PART No.	IDENTIFICATION CODES: ALL RESISTORS ± 10% UNLESS OTHERWISE STATED.
R11	470Ω	½	J569-57		Isolation See Note 1
R12	1 Meg.	½	J569-61		RF Grid
R13	1000Ω	½	J569-25		RF Screen
R14	1000Ω	½	J569-25		RF Plate Decoupling
R15	1 Meg.	½	J569-61		Mixer Grid
R16	39000Ω	½	J569-32		Mixer Grid Shunt
R17	1000Ω	½	J569-25		Mixer Screen
R18	100Ω	½	J569-13		Mixer Plate Decoupling
R19	100Ω	½	J569-13		Decoupling
R20	18KΩ	½	J566-40		Osc. Grid
R21	22000Ω	1	J571-29		Osc. Plate Decoupling
R22	10KΩ	½	K379-77		1st Video IF Grid
R23	100Ω	½	J569-13		1st Video IF Decoupling
R24	82Ω	½	J569-12		1st Video IF Cathode
R25	120Ω	½	J569-14		AGC Network
R26	10KΩ	½	K379-77		2nd Video IF Grid 5%
R27	82Ω	½	J569-12		2nd Video IF Cathode
R28	100Ω	½	J569-13		2nd Video IF Decoupling
R29	120Ω	½	J569-14		AGC Network
R30	10KΩ	½	K379-77		3rd Video IF Grid Coil Shunt 5%
R31	82Ω	½	J569-12		3rd Video IF Cathode
R32	560KΩ	½	J569-58	BTS-560K	AGC Network
R33	22KΩ	½	J569-41	BTS-22K	AGC Diode Load
R34A	10000Ω	½	J569-25	BTS-1000	Voltage Divider
B	27000Ω	½	J569-30	BTS-2700	" " See Note 1
R35A	47KΩ	1	J569-45	BTA-47K	" " "
B	100KΩ	1	J569-49	BTS-100K	" " See Note 1
R36	82000Ω	½	J569-36	BTS-8200	Video Det. Diode Load
R37	1 Meg.	½	J569-61	BTS-1 Meg.	Video Amp. Grid
R38A	39000Ω	½	J569-32	BTS-3900	Voltage Divider
B	10KΩ	½	J569-37	BTS-10K	" " See Note 1
R39	1 Meg.	½	J569-61	BTS-1 Meg.	Voltage Divider
R40	68000Ω	½	J569-35	BTS-6800	Video amp. Plate
R41	1 Meg.	½	J569-61	BTS-1 Meg.	Sync. Clipper Grid
R42	270Ω	½	J569-18	BA-¼-270	Sync. Clipper Cathode
R43	220KΩ	½	J569-53	BTS-220K	Sync. Clipper Plate
R44	180KΩ	½	J565-52	BTS-180K	Phase Correction
R45	560Ω	½	J569-22	BTS-560	Voltage Divider
R46	560Ω	½	J569-22	BTS-560	" "
R47	68KΩ	2	J572-47	BT-2-68K	" "

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	IRC PART No.	IDENTIFICATION CODES
R48	100Ω	½	J569-57	BTS-10K	Voltage Divider
R49	150KΩ	½	J569-61	BTS-150K	Picture Tube Cathode
R50	1000Ω	½	J569-25		Sound IF Decoupling See Note 2
R51	82Ω	½	J569-12		Sound IF Cathode
R52A	1000Ω	½	J569-25		Sound IF Decoupling
B	470Ω	½	J569-21		" " " See Note 1
R53	15KΩ	½	J569-45	BTS-15K	De-emphasis
R54A	47KΩ	½	J569-45	BTS-47K	Ratio Det. Diode Load
B	33KΩ	½	J569-45	BTS-33K	" " " " See Note 1
R55	470KΩ	½	J569-57	BTS-470K	AF Grid See Note 3
R56	470KΩ	½	J569-57	BTS-470K	Voltage Divider See Note 2
R57	470KΩ	½	J569-57	BTS-470K	" " " See Note 2
R58A	330KΩ	½	J569-56	BTS-330K	AF Plate
B	390KΩ	½	J569-56	BTS-390K	" " " See Note 1
R59	1 Meg.	½	J569-61	BTS-1 Meg.	Feedback See Note 2
R60	270KΩ	½	J569-54	BTS-270K	Output Grid
R61A	330KΩ	½		BTS-330K	Voltage Divider
B	47KΩ	½	J569-45	BTS-47K	" " " See Note 1
R62A	180KΩ	½	J569-52	BTS-180K	" " "
B	47000Ω	½	J569-33	BTS-4700	" " " See Note 1
R63	4700Ω	½	J569-33	BTS-4700	Integrator Network
R64	4700Ω	½	J569-33	BTS-4700	Integrator Network
R65	100KΩ	1	J571-49	BTA-100K	Vert. Osc. Plate
R66	1000Ω	½	J569-25	BTS-1000	Vert. Osc. Cathode
R67	470KΩ	½	J566-57	BTS-470K	Vert. Osc. Grid
R68	4.7 Meg.	½	J569-69	BTS-4.7 Meg.	Vert. Osc. Plate
R69	4.7 Meg.	½	J569-69	BTS-4.7 Meg.	Vert. Osc. Plate
R70	4.7 Meg.	½	J566-69	BTS-4.7 Meg.	Vert. Output Grid
R71	150KΩ	½	J569-51	BTS-150K	" "
R72	15KΩ	½	J569-39	BTS-15K	Vert. Output Cathode
R73	820KΩ	½	J569-60	BTS-820K	Vert. Output Plate
R74	820KΩ	½	J569-60	BTS-820K	" " "
R75	2.2 Meg.	½	J569-65	BTS-2.2 Meg.	Feedback
R76	2.2 Meg.	½	J569-65	BTS-2.2 Meg.	Voltage Divider
R77	2.7 Meg.	1	J571-66		Vert. Deflection Load
R78	2.7 Meg.	1	J571-66		" " "
R79	470KΩ	½	J569-33	BTS-4700	Differentiator
R80	100KΩ	½	J571-49	BTA-100K	Horiz. Osc. Plate
R81	1000Ω	½	J569-25	BTS-1000	Horiz. Osc. Cathode
R82	220KΩ	½	J569-53	BTS-220K	Horiz. Osc. Grid
R83A	4.7 Meg.	½	J569-69	BTS-4.7 Meg.	Horiz. Osc. Plate
B	1.2 Meg.	½	J569-62	BTS-1.2 Meg.	" " " See Note 1
R84	10KΩ	1	J571-37	BTA-10K	Filter See Note 1
R85	4.7 Meg.	½	J569-69	BTS-4.7 Meg.	Horiz. Output Grid
R86	4.7 Meg.	½	J569-69	BTS-4.7 Meg.	" "
R87	47KΩ	1	J571-45	BTA-47K	Horiz. Output Plate
R88	47KΩ	2	J572-45	BT-2-47K	" " "
R89	2.7 Meg.	1	J571-66		Horiz. Deflection Load
R90	2.7 Meg.	1	J571-66		" " "
R91	4700Ω	½	J569-33	BTS-4700	HV Osc. Grid
R92	180KΩ	1	J571-50		HV Filter
R93	20Ω	5	E959-16		Surge Limiter See Note 1
R94	1200Ω	1	J571-26	BW-1-1200	Filter See Note 1
R95	25000Ω	5		AB-25000	HV Osc. Decoupling (Wire Wound) See Note 2
R96	680Ω	2	J572-23	BW-2-680	Filter See Note 1
R97	40Ω	5	E959-6		Surge Limiter (Wire Wound) See Note 2
R98	40Ω	5	E959-6		Surge Limiter (Wire Wound) See Note 2
R99	40Ω	5	E959-6		" " " " " "
R100	390Ω	1		BW-2-390	Filter See Note 2
R101	20Ω	10	E959-15	AB-20	Line Dropping (Wire Wound) See Note 1
R102	40Ω	5	E959-6	AB-40	Filament String (Wire Wound) See Note 1
R103	82Ω	½		BW-½-82	" " " " " "
R104	82Ω	1	K379-12	BW-1-82	" " " " " "
R105	2.7 Meg.	1	J571-66	BTA-2.7 Meg.	Voltage Divider
R106	2.7 Meg.	1	J571-66	BTA-2.7 Meg.	" "
R107	1 Meg.	1	J571-61		" "
R108	3.3 Meg.	1	J571-67		" "
R109	3.3 Meg.	1	J571-67		" "
R110	4.7 Meg.	1	J571-69		" "
R111	4.7 Meg.	1	J571-69		" "
R112	3.9 Meg.	1	J571-68		" "
R113	3.9 Meg.	1	J571-68		" "
R114	2.7 Meg.	1	J571-66		" "
R115	100Ω	1		BW-1-1000	Filter See Note 2
R116	220Ω	1	J569-41	BTS-220	Sync. Clipper Cathode
R117	1000Ω	1	J569-25	BTS-1000	Voltage Divider See Note 2

Note 1. Used in early production only.
Note 2. Used in late production only.
Note 3. Early production uses 8.2 Meg resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.
T1A	117VAC	800VCT @ .143 mA DC Tap @ 220 VAC	5VAC @ 2A	6.3VAC @ 1.2A	*			
B					L135-1 #			

Used in late production.
* Used in early production.

TRANSFORMER (H.V. OSC.)

ITEM No.	RATING: DC RESISTANCE	RATING: PRI.	RATING: SEC.	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	NOTES
T2	.442		Sec. 1 1.42Ω	K890-1				
			Sec. 2 13.2Ω					
			Sec. 3 .02					

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T3	1600Ω	2Ω	260Ω	.9Ω	Part of K892-1	A-3849	RO-303	A-2902	Mount on chassis.

SPEAKER

ITEM No.	RATING		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	NATIONAL PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	3.5Ω	K892-2		46A1	‡‡ Remount Output Transformer.
SP2	PM	3.5Ω	K892-1††		46A1‡‡	†† Includes Output Transformer
	CONE DIA.	V. C. DIA.				
SP3	4" x 6"	9/16"				
SP4	4" x 6"	9/16"				

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT @ 1000 ~	NATIONAL PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
L1	.143A	75Ω	2.8 Henries	K927-1	C-2325	R-8120	C-2991	

COILS (RF-IF)

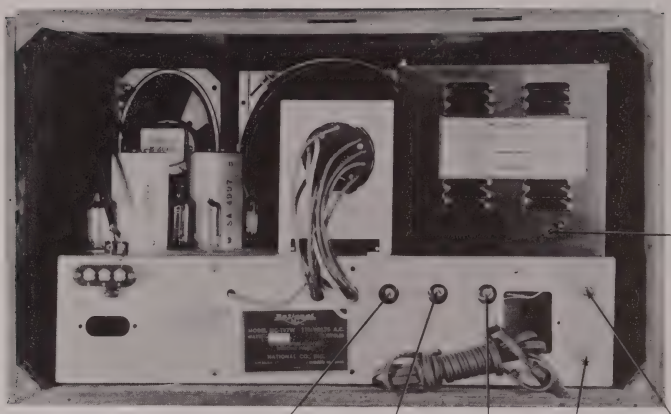
ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	NATIONAL PART No.	MEISSNER PART No.	
L2	Ant. Coil	0Ω		SA:5448		
L3	Ant. Coil	0Ω		SA:5457		
L4	Ant. Coil	0Ω		SA:5060-4, SA:5456, K908-1		Multi.-Tapped Coil
L5	RF Plate	0Ω		SA5059-2		
L6	RF Plate	0Ω		SA5055, SA5059-1, K908-1		Multi.-Tapped Coil
L7	Mixer Grid	0Ω		SA5059-1		
L8	Mixer Grid	0Ω		SA5060, K908-1		Multi.-Tapped Coil
L9	Osc. Coil	0Ω		SA5054-6		
L10	Osc. Coil	0Ω		SA5054-5		
L11	Osc. Coil	0Ω		SA5054-4		
L12	Osc. Coil	0Ω		SA5054-4		
L13	Osc. Coil	0Ω		SA5054-3		
L14	Osc. Coil	0Ω		SA5054-2		
L15	Osc. Coil	0Ω		SA5054-2		
L16	Osc. Coil	0Ω		SA5054-7		
L17	Osc. Coil	0Ω		SA5054-7		
L18	Fil. Choke	1Ω		SA5057		
L19	1st Video IF	.1Ω		SA5002		
L20	2nd Video IF	.1Ω		SA5002		
L21	RF Choke	1.4Ω		SA5069		
L22	3rd Video IF	.1Ω		SA5002		
L23	RF Choke	1.4Ω		SA5069		
L24	4th Video IF	.1Ω		SA5003		
L25	Peaking	4Ω		SA5065		Wound on 33KΩ resistor.
L26	Peaking	11Ω		SA5066		Wound on 8.2KΩ resistor.
L27	Peaking	4.5Ω		SA5067		Wound on 33KΩ resistor.
L28	Peaking	7Ω		SA5068		Wound on 1 Meg. resistor.
L29	Sound IF	5.5Ω		SA5450		
L30	Ratio Det. Trans.	7.2Ω	.8Ω	SA4997		

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	NATIONAL PART No.			
M1		K928-1			

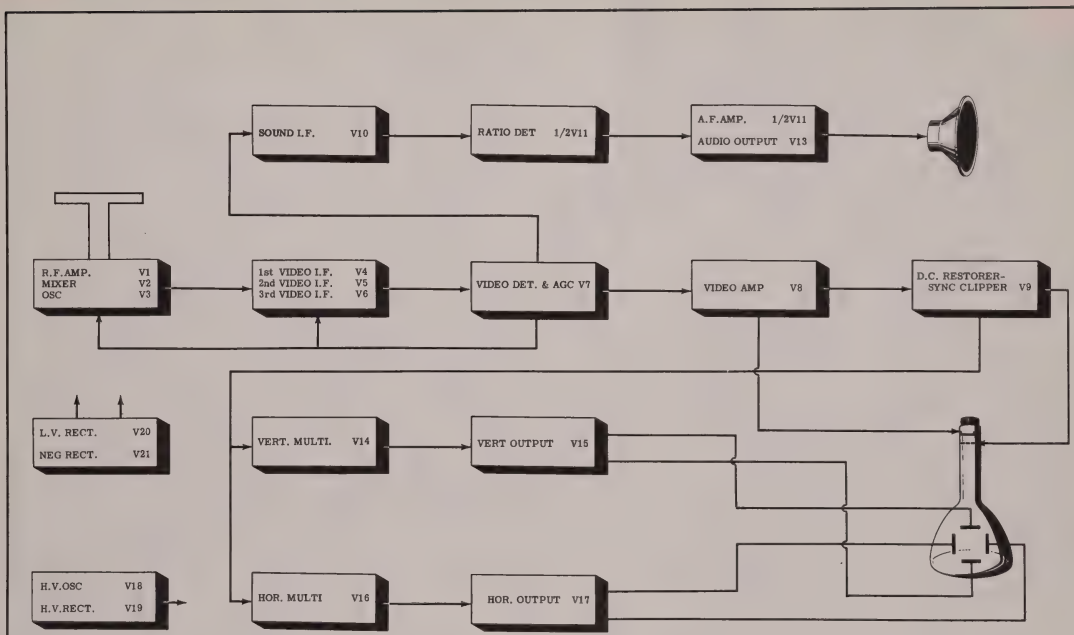
MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
M2	Fuse	F135-4	Type AGC 2A
M3	Fuse	F135-4	Type AGC 2A. Only one fuse used in late production.
	Switch	K900-1	Ant. Coil Rotary Sw. Part of Tuner.
	Switch	K900-1	RF Coil Rotary Sw. Part of Tuner.
	Switch	K900-1	Mixer Grid Coil Rotary Sw. Part of Tuner.
	Switch	K889-1	Osc. 9 Position Single Pole Sw. Part of Tuner.
	Switch	K889-1	" " " " " " " "
	Switch	K888-1	DPST Rotary Wafer. Used in models having untuned input only.



HORIZONTAL LINEARITY AND HIGH VOLTAGE ADJUSTMENTS

1. Set the horizontal size control and the horizontal linearity adjustment B1 for largest picture size consistent with good linearity.
2. Adjust the high voltage output trimmer B2 for correct horizontal size. It is possible to obtain two settings of B2 to give the correct picture size. Adjust B2 for resonance, indicated by smallest size picture, and then turn B2 counterclockwise for correct size picture. At this setting, B2 is on the lower capacity side of resonance, which will reduce the place current of the 12AU7 oscillator tube resulting in longer tube life.



BLOCK DIAGRAM

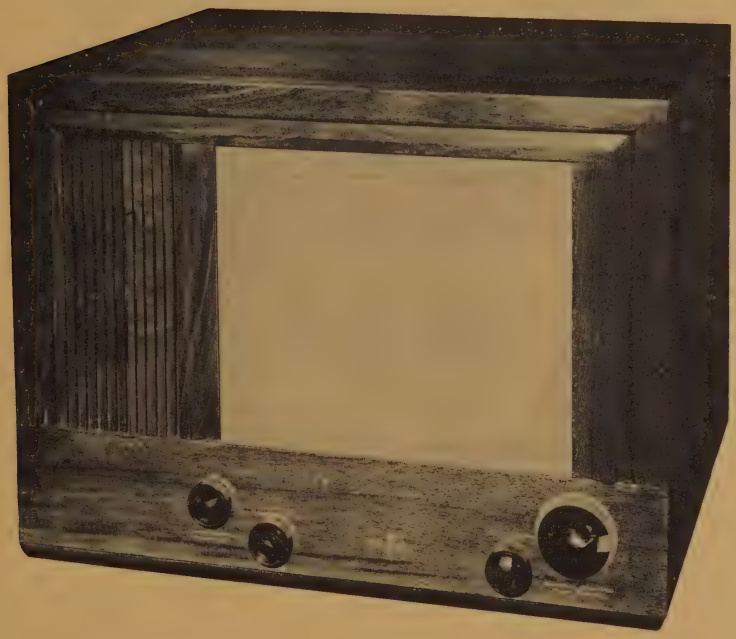
PHOTOFACT* Folder

OLYMPIC MODELS
TV104, TV105, TV922L, TV944, TV945

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



Model TV944

OLYMPIC MODELS
TV104, TV105, TV922L, TV944, TV945

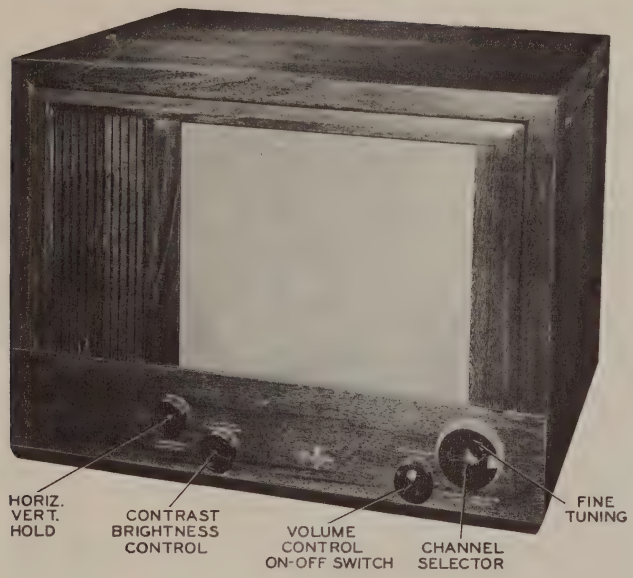
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

Date 8/49—No. 4915-15 Set No. 67—Folder No. 15

PHOTOFACT* Folder

OLYMPIC MODELS TV-104, 105, 106, 107, 108, 922L, 944, 945, 946



OLYMPIC MODELS TV-104, 105, 106, 107, 108, 922L, 944, 945, 946

OLYMPIC MODEL TV-944

TRADE NAME Olympic Models,TV-104,TV-105,TV-106,TV-107,TV-108,TV-922L (Ser.#E-10,000 to E-16,000 Incl) TV-944,TV-945,TV-946.
MANUFACTURER Olympic Radio and Tel. Corp., 3101-19 38th Ave., Long Island City, New York
TYPE SET Television Receiver
TUBES Twenty-Three

POWER SUPPLY 105-125 Volts, 60 Cycles AC RATING: 1.75 Amps @ 117 Volts
TUNING RANGE—Channels 2 through 13

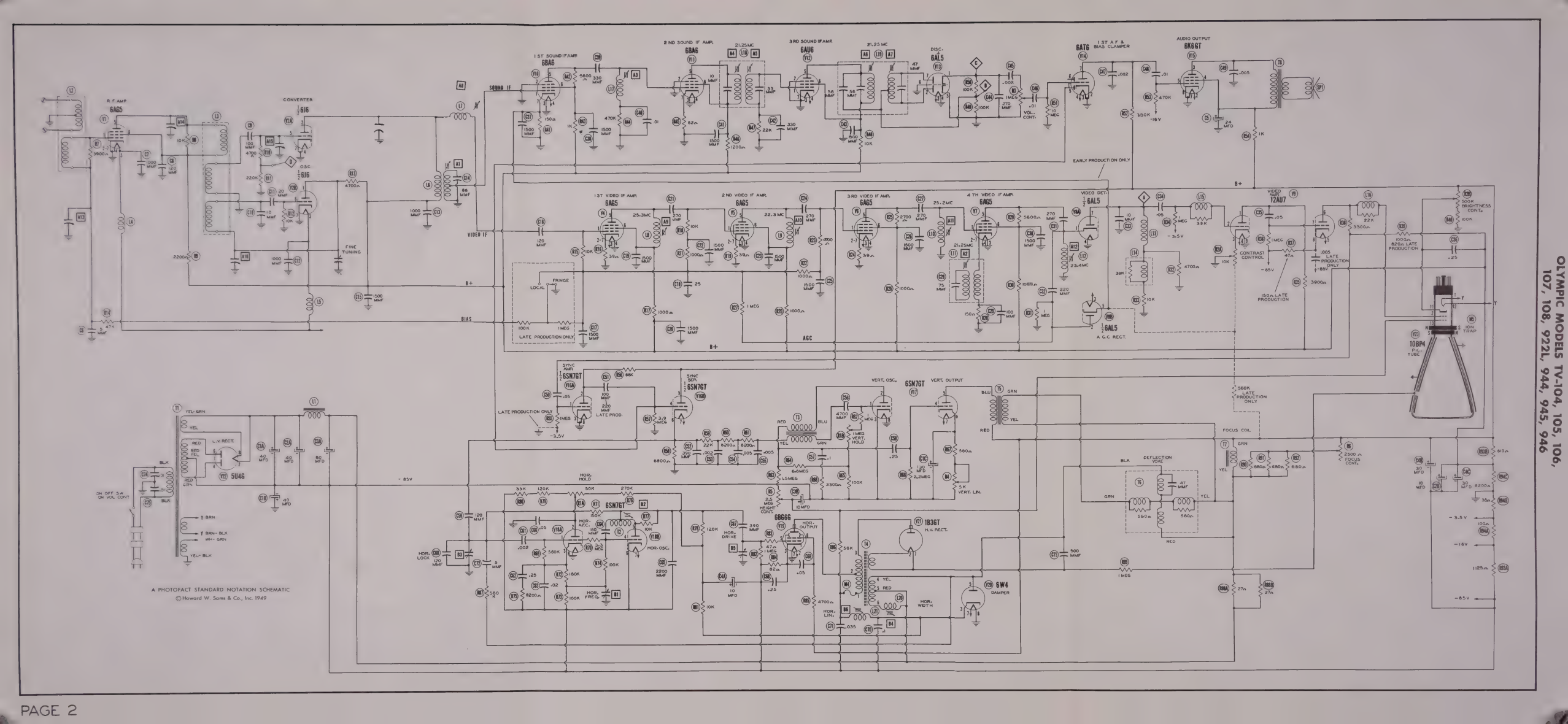
INDEX

	Page		Page
Alignment Instructions	8,9,10	Photographs (continued)	
Block Diagram	23	Tuner (CL-1428)	6
Disassembly Instructions	24	Tuner (CL-1633)	11
Horizontal Osc. and Linearity Adjustments	24	Tuner (CL-1677)	7
Parts List and Description	18,19,20	Trans., Inductor and Alignment Identification	4,13
Photographs		Schematic	2
Cabinet Rear View	20	Schematic-Tuner CL-1428	14
Capacitor Identification	5,12	Schematic-Tuner CL-1633	17
Chassis-Top View	3	Tube Placement Chart	21
High Voltage Compartment	23	Voltage and Resistance Measurements	16
Resistor Identification	15,22		

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

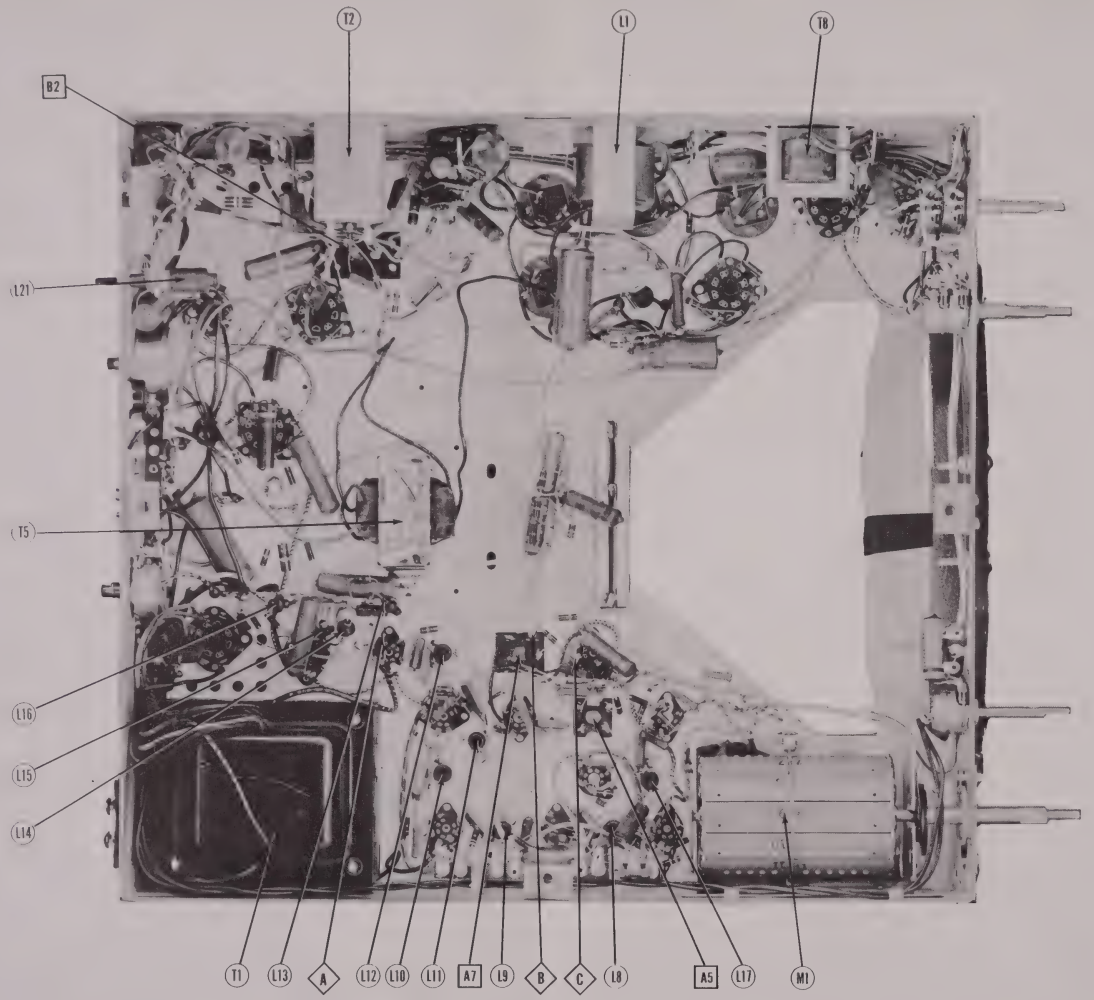
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 8/49 4915-15 SET #67 FOLDER 15

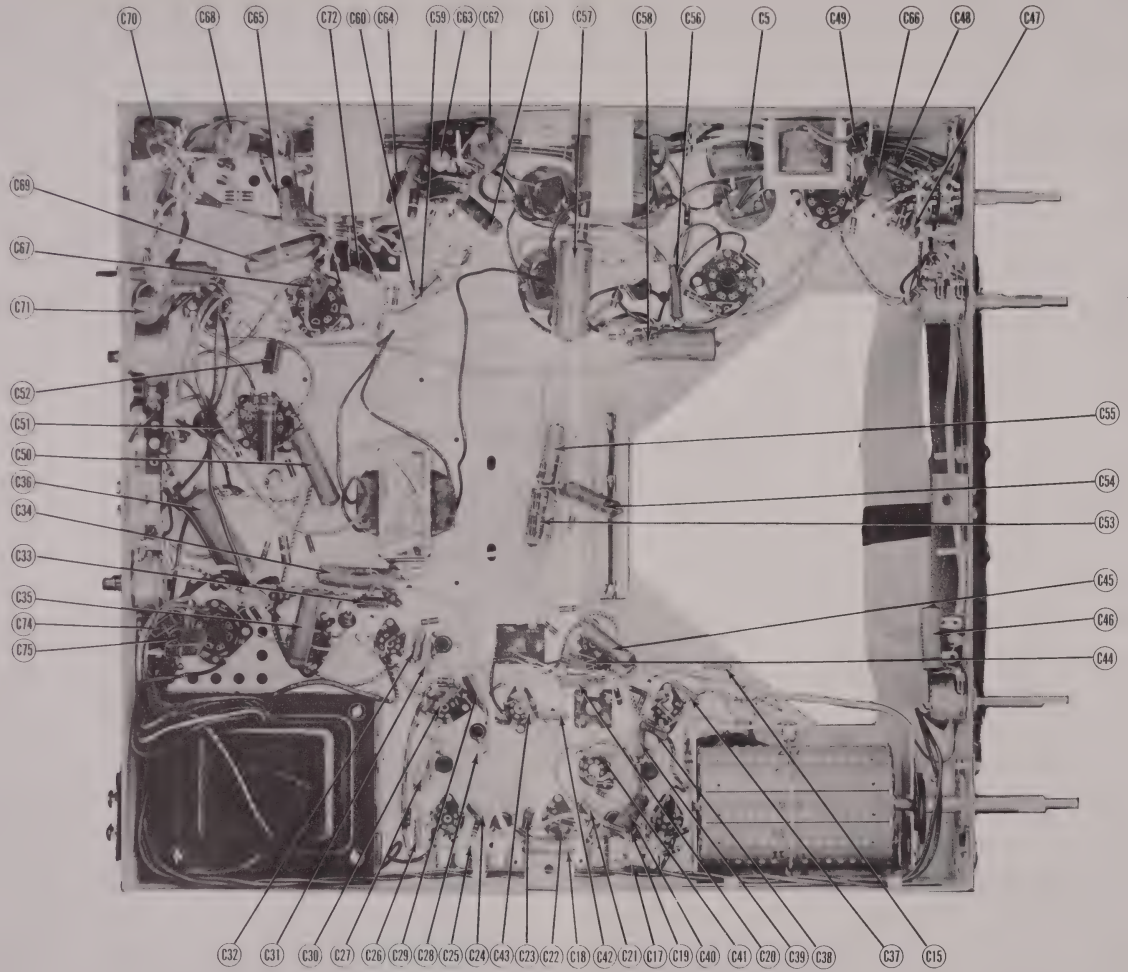


OLYMPIC MODELS TV-104, 105, 106, 107, 108, 922L, 944, 945, 946

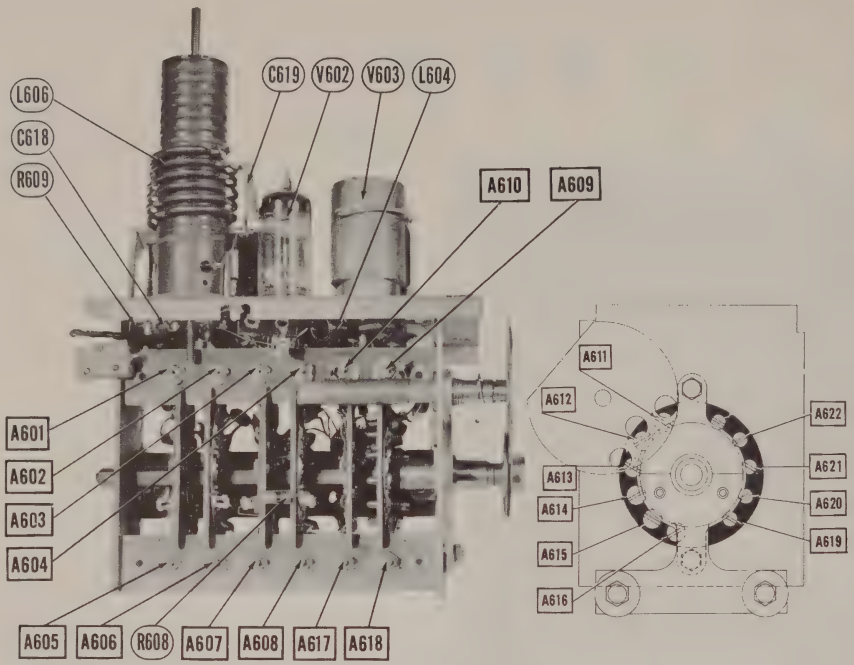
CHASSIS TOP VIEW



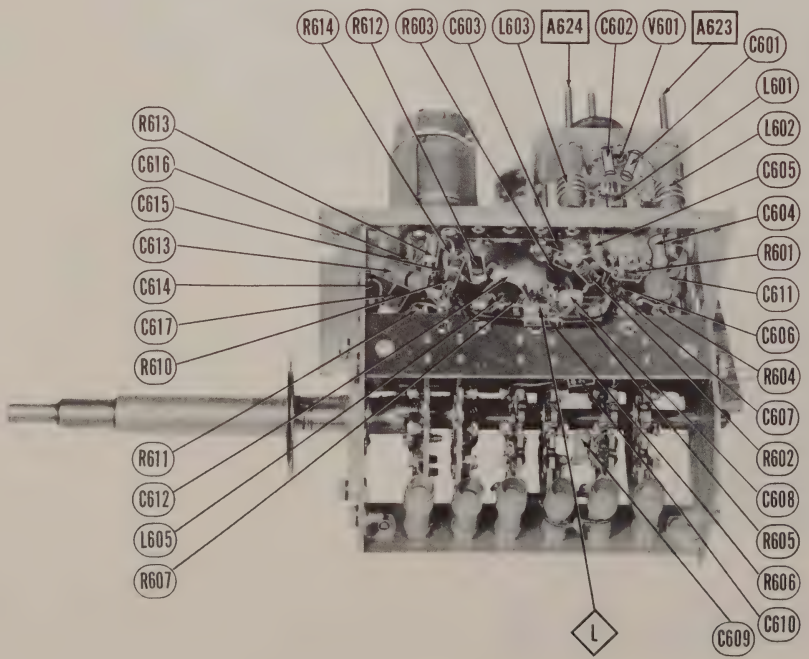
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



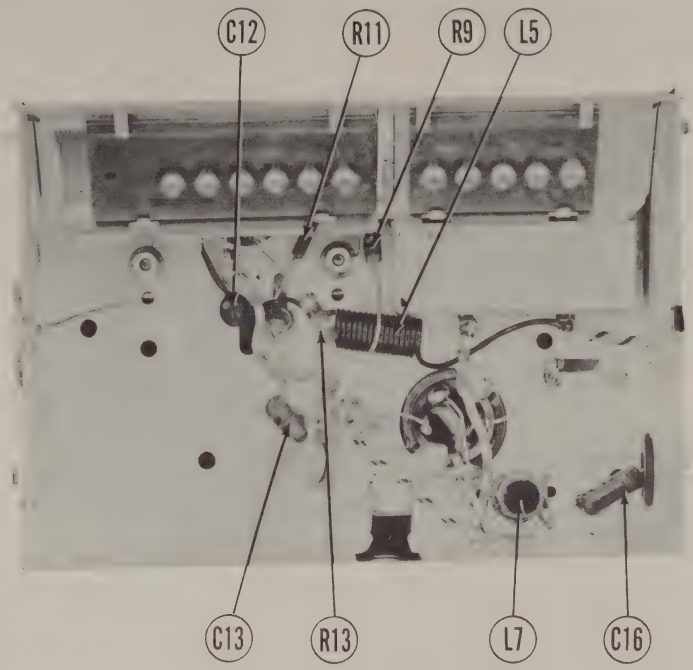
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



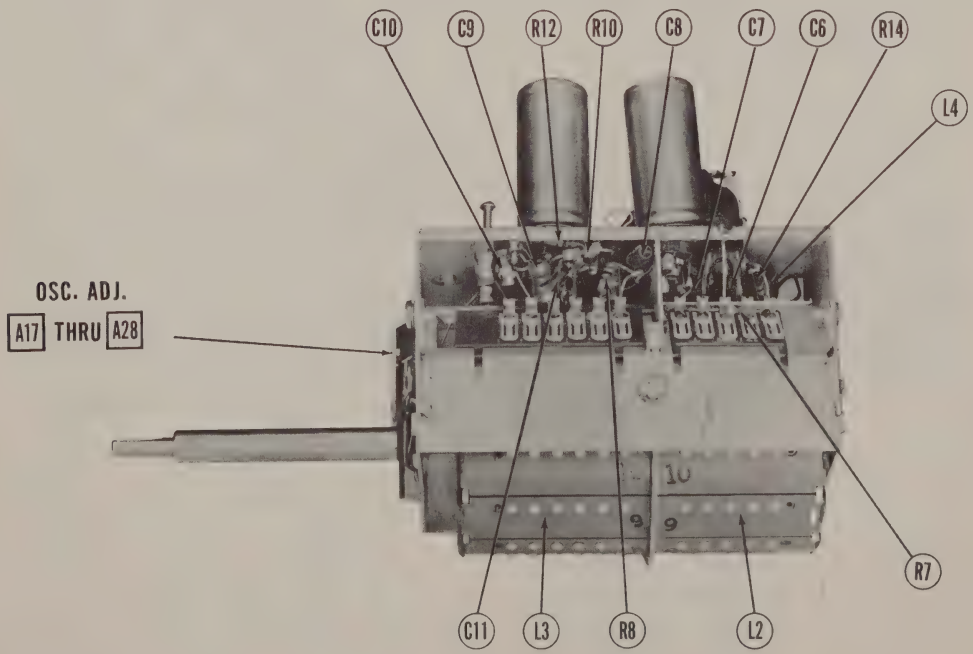
RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



RF TUNER-RIGHT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If receiver is aligned with the picture tube removed, remove the horizontal oscillator tube V18 (6SN7GT) to eliminate the high voltage shock hazard.

The alignment procedure which follows is given in order which should be followed when complete alignment is performed.

VIDEO IF TRAP ADJUSTMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	21.25MC (Very Accurately)	9 (If unused locally)	DC Probe to Point (A) Common to chassis.	A1, A2	Adjust for minimum deflection.

SOUND IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
2.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	21.25MC (Very accurately)	9 (If unused locally)	DC Probe to Point (B) Common to chassis.	A3,A4, A5,A6	Adjust for maximum deflection. Attenuate signal generator to maintain a 2 volt VTVM reading.
3.		"	"	"	DC Probe to Point (C) Common to chassis.	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Repeat the adjustments of A6 and A7.

VIDEO IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	21.8MC	9 (If unused locally)	DC Probe to Point (A) Common to chassis.	A8	Adjust for maximum deflection.
5.		"	25.3MC	"	"	A9	"
6.		"	22.3MC	"	"	A10	"
7.		"	25.2MC	"	"	A11	"
8.		"	23.4MC	"	"	A12	"

VIDEO IF RESPONSE CHECK

Connect a 1 1/2 volt bias battery-negative to pin 2 of V8, positive to chassis.

Connnect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	25MC (10MC Sweep)	21.25MC 22.25MC 25.75MC	9	Vert.Amp. to Point (A) Low side to chassis.		Check response curve to see that it is similar to Fig 1. If slight retouching is necessary to reposition markers, adjust A1 and A2 until 21.25MC marker disappears. Adjust A9 and A11 to position the 25.75MC marker. Adjust A8 and A10 to position the 22.25MC marker. A12 will give the curve a flat top. Recheck the position of the 25.75MC marker. Remove bias battery.

RF TUNERS

This model receiver is made using one of three tuners. Determine which tuner is being used and follow the alignment procedure for that particular tuner.

RF AMP. ALIGNMENT (TUNER CL-1786)

Connect 1 1/2 volt bias battery as used in video IF alignment. Negative to pin 2 of V8, positive to chassis.

Set the fine tuning control to its midposition. This particular tuner incorporates one of two types of fine tuning control. Those tuners having the fine tuning bakelite disc located in back of the oscillator slug and adjustment hole, the midpoint of its range is when the fine tuning shaft is turned completely counter-clockwise.

Those models having the fine tuning bakelite disc located in front of the oscillator slug adjustment hole, the midpoint of the fine tuning range is attained when the bakelite disc faces directly downward.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 125Ω carbon res.	Across antenna terminals with 125Ω resistor in each generator lead.	207MC (10MC Sweep)	205.25MC 209.75MC	12	Vert.Amp. thru 10KΩ to Point (D) Low side to chassis.	A13,A14 A15	Adjust for flat topped response curve as per Fig 2. with markers appearing not less than 70% of max. amplitude of the curve.
11.	"	"	213MC (10MC Sweep)	211.25MC 215.75MC	13	"		Check response on all channels. A13 and A14 and A15 may be adjusted slightly to obtain optimum response on all channels.
			201MC (10MC Sweep)	199.25MC 203.75MC	11			
			195MC (10MC Sweep)	193.25MC 197.75MC	10			
			189MC (10MC Sweep)	187.25MC 191.75MC	9			
			183MC (10MC Sweep)	181.25MC 185.75MC	8			
			177MC (10MC Sweep)	175.25MC 179.75MC	7			
			85MC (10MC Sweep)	83.25MC 87.75MC	6			
			79MC (10MC Sweep)	77.25MC 81.75MC	5			
			69MC (10MC Sweep)	67.25MC 71.75MC	4			

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
		63MC (10MC Sweep)	61.25MC 65.75MC	3			
		57MC (10MC Sweep)	55.25MC 59.75MC	2			

OSCILLATOR ALIGNMENT (TUNER CL-1677)

Complete alignment of the oscillator circuit may not be necessary. This is determined by checking to see that a zero reading is obtained for each channel when the fine tuning control is tuned through the midpoint of its range. (Connect signal generator and VTVM as in steps 12 and 13. Sound carrier frequencies are listed in step 13.) If the majority of the channels seem to need oscillator alignment, this sometimes may be done in one operation-step 12-by adjusting A16. It should be noted that this is an all-channel adjustment and should not be adjusted for individual channels. If step 12 fails to align the oscillator circuits sufficiently, it will be necessary to adjust the oscillator coil slugs. These are accessible one channel at a time. Set the fine tuning control to the midposition of its range.(See RF Amp. Alignment Tuner CL-1677 for this setting.)

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	Direct	High side to one antenna terminal. Low side to chassis.	209.75MC	12	DC Probe to Point ⓒ Common to chassis.	A16	Adjust for zero reading between positive and negative peaks with fine tuning control at its midpoint. Rotate channel selector switch and adjust individual channels outlined in step 13. Then repeat step 12.
13.	Direct	"	215.75MC	13	"	A17	
			209.75MC	12	"	A18	
			203.75MC	11	"	A19	
			197.75MC	10	"	A20	
			191.75MC	9	"	A21	
			185.75MC	8	"	A22	
			179.75MC	7	"	A23	
			87.75MC	6	"	A24	
			81.75MC	5	"	A25	
			71.75MC	4	"	A26	
			65.75MC	3	"	A27	
			59.75MC	2	"	A28	

RF AMP. ALIGNMENT (TUNER CL-1428)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two125Ω carbon res.	Across antenna terminals with 125Ω resistor in each generator lead.	213MC (10MC Sweep)	211.25MC 215.75MC	13	Vert.Amp. thru 10KΩ to Point ① Low side to chassis.	A601, A602, A603, A604	Adjust for approx. response pattern as per Fig 2 with markers appearing more than 70% of peak amplitude. Keep RF and Mixer slug pairs in approx. same relative position.
11.	"	"	207MC (10MC Sweep)	205.25MC 209.75MC	12	"		Check response pattern for all high band channels. Slight adjustments of A601 thru A604 may be required to obtain optimum response on all these channels.
			201MC (10MC Sweep)	199.25MC 203.75MC	11			
			195MC (10MC Sweep)	193.25MC 197.75MC	10			
			189MC (10MC Sweep)	187.25MC 191.75MC	9			
			183MC (10MC Sweep)	181.25MC 185.75MC	8			
			177MC (10MC Sweep)	175.25MC 179.75MC	7			
12.	"	"	85MC (10MC Sweep)	83.25MC 87.75MC	6	"	A605, A606, A607, A608	Adjust for approximate response as per Fig 2. Keep slug pairs in approx. the same relative position.
13.	"	"	79MC (10MC Sweep)	77.25MC 81.75MC	5	"		Check response on all low band channels. Slight adjustments of A605 thru A608 may be required to give optimum response on all these channels.
			69MC (10MC Sweep)	67.25MC 71.75MC	4			
			63MC (10MC Sweep)	61.25MC 65.75MC	3			
			57MC (10MC Sweep)	55.25MC 59.75MC	2			

ALIGNMENT INSTRUCTIONS CONTINUED ON NEXT PAGE

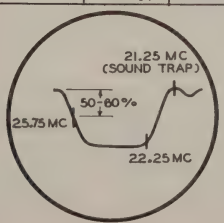


FIG. 1

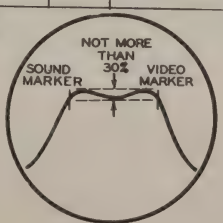


FIG. 2

ALIGNMENT INSTRUCTIONS (CONT.)

OSCILLATOR ALIGNMENT (TUNER CL-1428)

Set the fine tuning control approximately 140° from its full counter-clockwise position. This aligns the holes in the drive disc with the adjustment screws on the oscillator switch wafer. Do not change this position during the entire oscillator alignment.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
14.	Two 125Ω carbon res.	Across antenna terminals.	215.75MC	13	DC Probe to Point (C) Common to chassis.	A609 or A610	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
15.	"	"	209.75MC	12	"	A611	"
			203.75MC	11		A612	"
			197.75MC	10		A613	"
			191.75MC	9		A614	"
			185.75MC	8		A615	"
			179.75MC	7		A616	"
			87.75MC	6		A617 or A618	"
			81.75MC	5		A619	"
			71.75MC	4		A620	"
			65.75MC	3		A621	"
			59.75MC	2		A622	"

WAVE TRAP ADJUSTMENTS (TUNER CL-1428)

Wave traps A623 and A624 are used for specific types of interference and their alignment will depend upon the type encountered. With the receiver tuned to the channel having the interference set fine tuning control until interference is at maximum. Adjust A623 and A624 for minimum interference in the picture and sound, keeping the cores at approximately the same relative position. Turn one core 1/2 turn, adjust the other for minimum interference.

RF AMP. ALIGNMENT (TUNER CL-1633)

The RF Amp. and Mixer cuicuits of this tuner are pre-aligned at the factory and normally do not require adjustment. However, if tuner is definitely known to be out of alignment, it will be necessary to remove the tuner and use extended leads for B+ and the filament supply. Remove the oscillator tube V301 and set the fine tuning control to the center of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 125Ω carbon res.	Across antenna terminals with 125Ω resistor in each generator lead.	213MC (10MC Sweep)	211.25MC 215.75MC	13	Vert.Amp. thru 10KΩ to Point (K) Low side to chassis.	A301, A302, A303, A304	Adjust for approx. response curve shown in Fig 2. with markers appearing more than 70% of peak amplitude. Keep RF and mixer trimmer pairs in approximately the same relative position.
11.	"	"	177MC (10MC Sweep)	175.25MC 179.75MC	7	"	A305, A306	Adjust rings for wave form per Fig. 2.
12.	"	"	183MC (10MC Sweep)	181.25MC 185.75MC	8	"		Check response on all high-band channels. Slight adjustments of A301 thru A306 may be required to obtain optimum response for all high-band channels.
			189MC (10MC Sweep)	187.25MC 191.75MC	9			
			195MC (10MC Sweep)	193.25MC 197.75MC	10			
			201MC (10MC Sweep)	199.25MC 203.75MC	11			
			207MC (10MC Sweep)	205.25MC 209.75MC	12			
13.	"	"	85MC (10MC Sweep)	83.25MC 87.75MC	6	"	A307, A308, A309, A310	Adjust for approximate response as per Fig 2.
14.	"	"	79MC (10MC Sweep)	77.25MC 81.75MC	5	"		Check response on all low-band channels. Slight adjustments on A307 thru A310 may be required to obtain optimum response on all low band channels.
			69MC (10MC Sweep)	67.25MC 71.25MC	4			
			63MC (10MC Sweep)	61.25MC 65.75MC	3			
			57MC (10MC Sweep)	55.25MC 59.75MC	2			

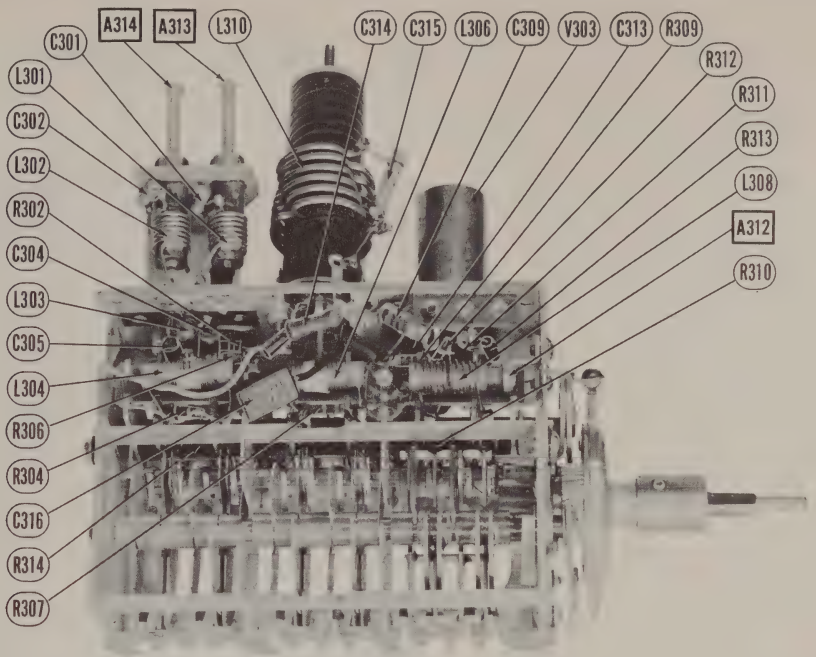
OSCILLATOR ALIGNMENT (TUNER CL-1633)

Replace oscillator tube V301 and recheck the fine tuning control to see that it is at the midpoint of its range.

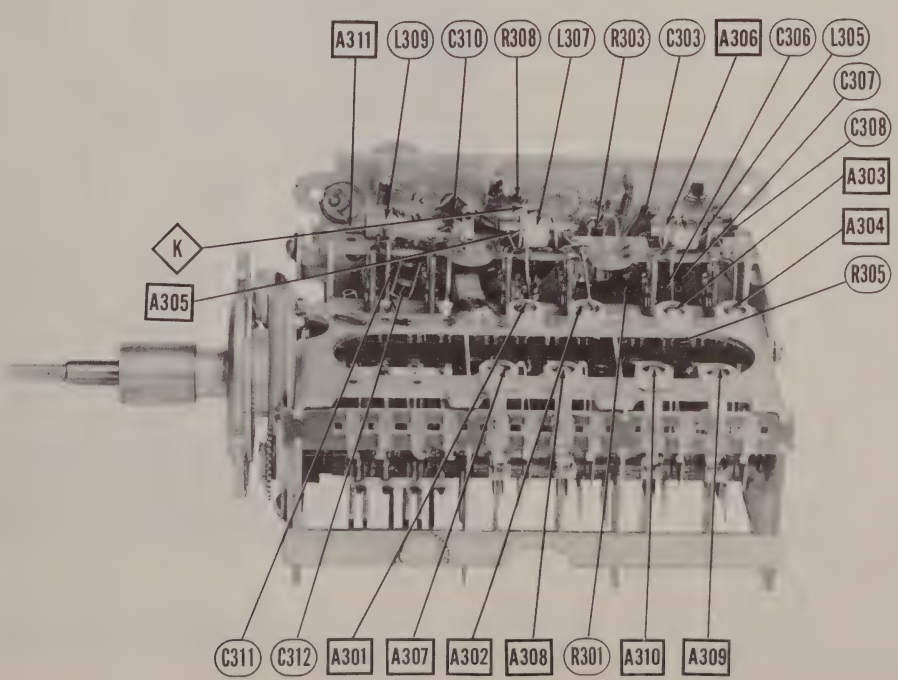
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
15.	Two 125Ω carbon res.	Across antenna terminals.	215.75MC	13	DC Probe to Point (C) Common to chassis.	A311	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
16.	"	"	87.75MC	6	"	A312	"
17.	"	"			"		Check to see that all other channels are received well within the limits of the fine tuning control. If not, compromise may be made using A311 for channels 7 thru 13 and A312 for channels 2 thru 6.

WAVE TRAP ADJUSTMENT (TUNER CL-1633)

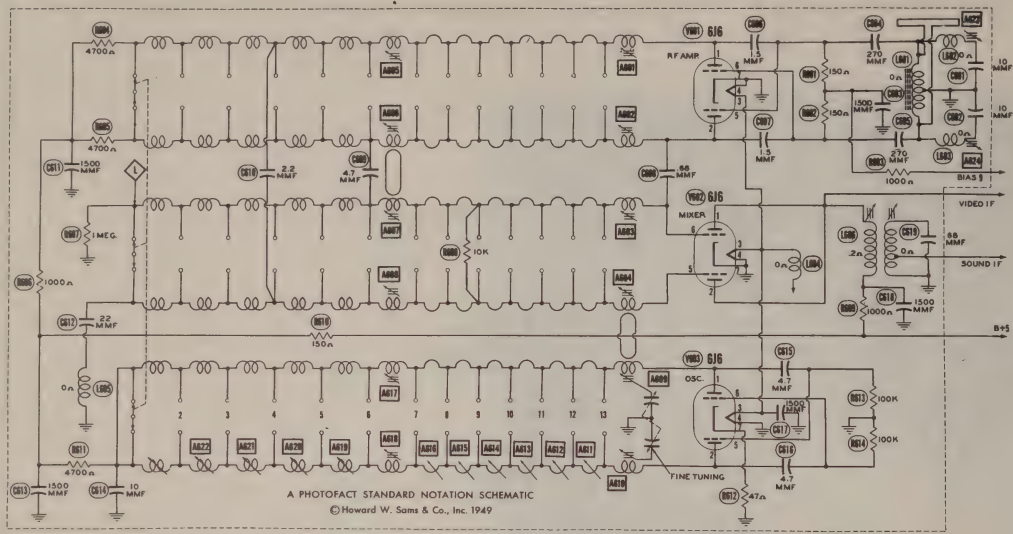
Wave traps A313 and A314 are used for specific types of interference and their alignment will depend upon the type encountered. With the receiver tuned to the channel having the interference set fine tuning control until interference is at maximum. Adjust A313 and A314 for minimum interference in the picture and sound, keeping the cores at approximately the same relative position. Turn one core 1/2 turn, adjust the other for minimum interference.



RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE



RF TUNER

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	
V601	R. F. Amp.	6J6	7BF	
V602	Mixer	6J6	7BF	
V603	Oscillator	6J6	7BF	

CAPACITORS

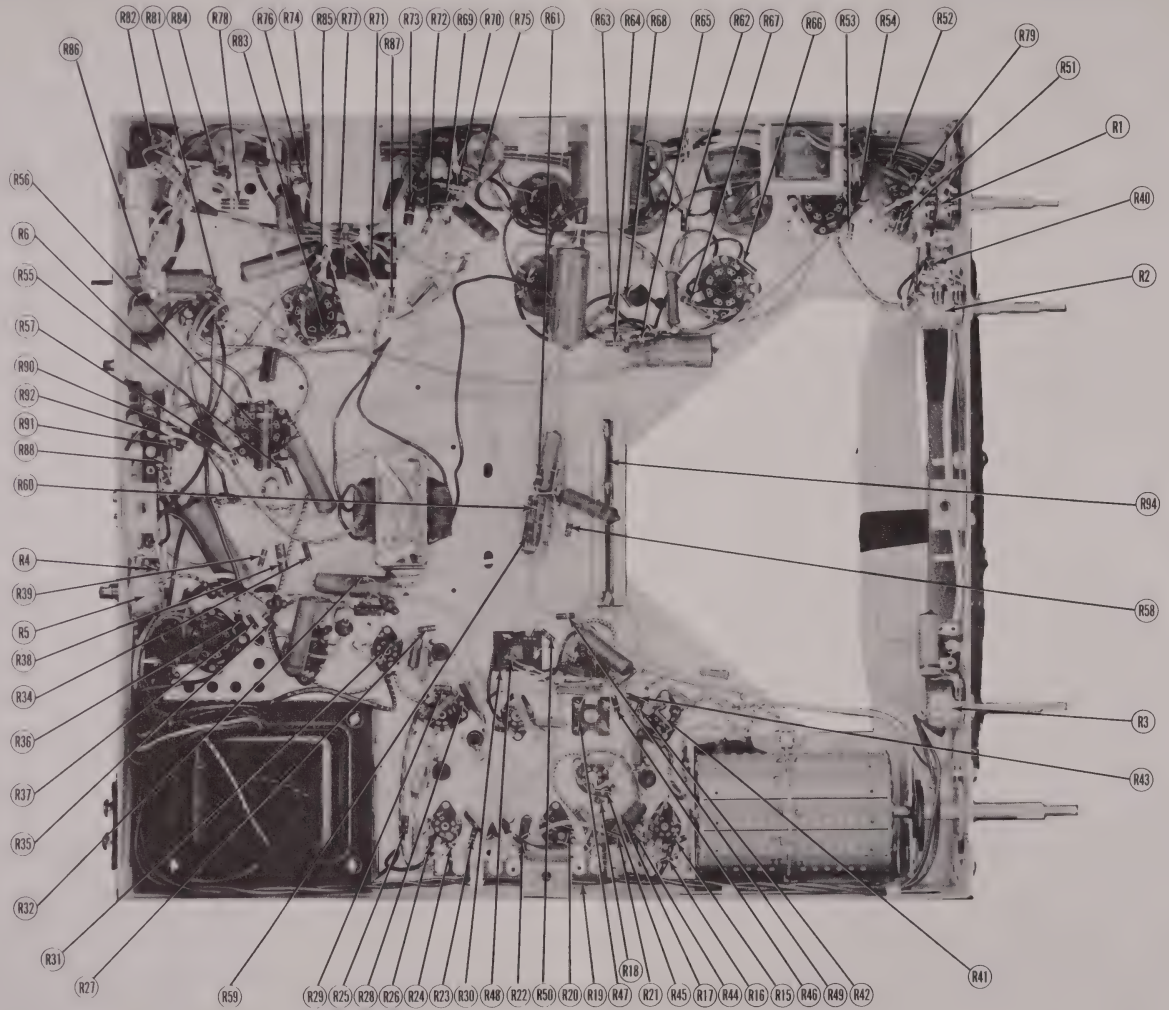
ITEM No.	RATING: CAP.	RATING: VOLT	IDENTIFICATION
C601	10		Fixed Trimmer
C602	10		Fixed Trimmer
C603	1500		RF Bypass
C604	270		RF Coupling
C605	270		RF Coupling
C606	1.5		Neutralizing
C607	1.5		Neutralizing
C608	.68		RF Coupling
C609	4.7		RF Coupling
C610	2.2		RF Coupling
C611	1500		RF Decoupling
C612	22		Fixed Trimmer
C613	1500		Osc. Decoupling
C614	10		Fixed Trimmer
C615	4.7		Osc. Feedback
C616	4.7		Osc. Feedback
C617	1500		Filament Bypass
C618	1500		Mixer Decoupling
C619	68		Fixed Trimmer

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	IDENTIFICATION
R601	150Ω	½	RF Grid
R602	150Ω	½	RF Grid
R603	1000Ω	½	Bias Filter
R604	4700Ω	½	RF Plate
R605	4700Ω	½	RF Plate
R606	1000Ω	½	RF Decoupling
R607	1 Meg.	½	Mixer Grid
R608	10KΩ	½	Mixer Grid Shunt
R609	1000Ω	½	Mixer Decpupling
R610	150Ω	½	Decoupling
R611	4700Ω	½	Osc. Plate
R612	47Ω	½	Osc. Cathode
R613	100KΩ	½	Osc. Grid
R614	100KΩ	½	Osc. Grid

COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	
L601	Ant. Input	0Ω		
L602	Interference Trap	0Ω		
L603	Interference Trap	0Ω		
L604	Filament Choke	0Ω		
L605	Mixer Grid Trap	0Ω		
L606	1st. Video IF and Sound Trap	.2Ω	0Ω	



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.3VDC	0V	6.3VAC	0V	150VDC	150VDC	0V		
V 2	6J6	70VDC	160VDC	6.3VAC	0V	-1.5VDC	§-4VDC	0V		
V 3										
V 4	6AG5	-1.3VDC	.1VDC	6.3VAC	0V	110VDC	115VDC	.1VDC		
V 5	6AG5	-.4VDC	.1VDC	6.3VAC	0V	110VDC	115VDC	.1VDC		
V 6	6AG5	0V	.3VDC	6.3VAC	0V	85VDC	115VDC	.3VDC		
V 7	6AG5	0V	1.2VDC	0V	6.3VAC	80VDC	115VDC	1.2VDC		
V 8	6AL5	0V	-1.8VDC	6.3VAC	0V	0V	0V	-1VDC		
V 9	12AU7	120VDC	-.7VDC	4.3VDC	6.3VAC	6.3VAC	♦145VDC	♦-.1VDC	♦.8VDC	0V
V 10	6BA6	0V	0V	0V	6.3VAC	120VDC	120VDC	0V		
V 11	6BA6	0V	0V	0V	6.3VAC	110VDC	110VDC	1VDC		
V 12	6AU6	-.3VDC	0V	0V	6.3VAC	65VDC	65VDC	0V		
V 13	6AL5	0V	-.3VDC	6.3VAC	0V	0V	0V	-.3VDC		
V 14	6AT6	-.5VDC	0V	0V	6.3VAC	-.7VDC	0V	85VDC		
V 15	6K6GT	0V	6.3VAC	195VDC	200VDC	-5.2VDC	-15VDC	0V	0V	
V 16	6SN7GT	-.1VDC	105VDC	0V	-.1VDC	225VDC	8VDC	6.3VAC	0V	
V 17	6SN7GT	♦-10VDC	♦75VDC ♦145VDC	♦0V	♦0V	♦325VDC	♦9VDC ♦16.5VDC	6.3VAC	0V	
V 18	6SN7GT	♦-7VDC	♦85VDC	♦-1.8VDC	♦-49VDC	162VDC	♦0V	6.3VAC	0V	
V 19	6BG6G	0V	6.3VAC	♦7.2VDC	0V	♦-.2VDC	♦-.3VDC	0V	♦240VDC	*
V 20	6W4GT	-75VDC	315VDC	340VDC	0V	265VDC	0V	6.3VAC	0V	
V 21	1B3GT	* DO NOT MEASURE								
V 22	5U4G	0V	280VDC	0V	365VAC	0V	365VAC	0V	280VDC	
V 23	12LP4	#125VDC	65VDC	PIN 10 330VDC	PIN 11 230VDC	PIN 12 #125VDC				

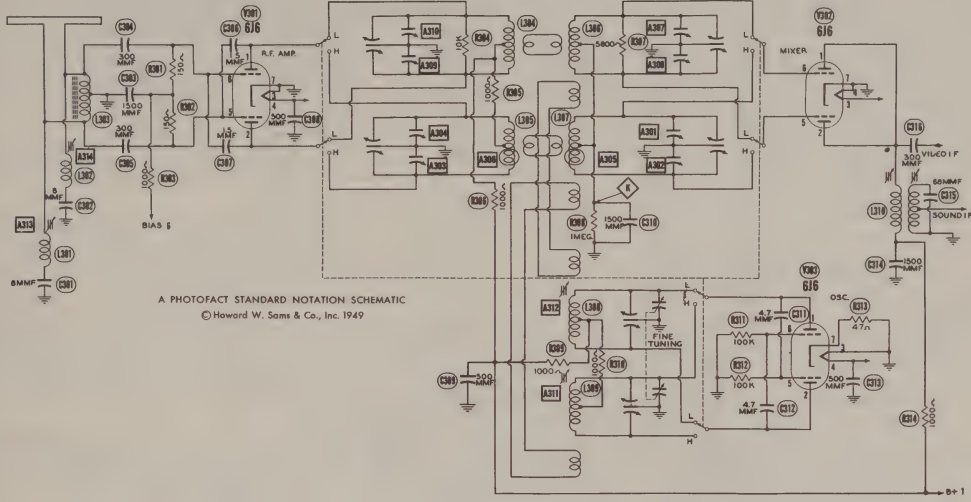
* Do not measure
§ Taken with vacuum tube voltmeter
♦ Measured from pin 3 of V17
6.3VAC measured across filament.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	2 Meg.	0Ω	.1Ω	0Ω	†3.5KΩ	†3.5KΩ	0Ω		
V 2	6J6	†6KΩ	†1000Ω	.1Ω	0Ω	220KΩ	10KΩ	0Ω		
V 3										
V 4	6AG5	2 Meg.	40Ω	.1Ω	0Ω	†2.2KΩ	†2.2KΩ	40Ω		
V 5	6AG5	2 Meg.	40Ω	.1Ω	0Ω	†2.2KΩ	†2.2KΩ	40Ω		
V 6	6AG5	2 Meg.	40Ω	.1Ω	0Ω	†5KΩ	†2.2KΩ	40Ω		
V 7	6AG5	.1Ω	150Ω	0Ω	.1Ω	†8KΩ	†2.2KΩ	150Ω		
V 8	6AL5	0Ω	1 Meg.	.1Ω	0Ω	150Ω	0Ω	5KΩ		
V 9	12AU7	†5KΩ	1 Meg.	10KΩ	.1Ω	.1Ω	†5.5KΩ	1 Meg.	800Ω	0Ω
V 10	6BA6	0Ω	0Ω	0Ω	.1Ω	†8KΩ	†2.2KΩ	150Ω		
V 11	6BA6	470KΩ	0Ω	0Ω	.1Ω	†2.5KΩ	†2.5KΩ	82Ω		
V 12	6AU6	22KΩ	0Ω	0Ω	.1Ω	†11.5KΩ	†11.5KΩ	0Ω		
V 13	6AL5	200KΩ	100KΩ	.1Ω	0Ω	0Ω	0Ω	100KΩ		
V 14	6AT6	10 Meg.	0Ω	0Ω	.1Ω	4 Meg.	Inf.	†330KΩ		
V 15	6K6GT	Inf.	.1Ω	†1.5KΩ	†1.2KΩ	470KΩ	135Ω	0Ω	0Ω	
V 16	6SN7GT	1 Meg.	†68KΩ	0Ω	4 Meg.	†390Ω	6.8KΩ	.1Ω	0Ω	
V 17	6SN7GT	2.5 Meg.	♦4 Meg. ♦1.5Meg.	750Ω	2.2 Meg.	†800Ω	6KΩ 1.8KΩ	.1Ω	0Ω	
V 18	6SN7GT	850KΩ	♦250KΩ	280KΩ	200KΩ	♦140KΩ	750Ω	.1Ω	0Ω	
V 19	6BG6G	Inf.	.1Ω	800Ω	Inf.	1 Meg.	1 Meg.	0Ω	†5KΩ	♦200Ω
V 20	6W4GT	750Ω	140KΩ	140KΩ	Inf.	9KΩ	Inf.	0Ω	.1Ω	
V 21	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	♦350Ω
V 22	5U4G	Inf.	10KΩ	Inf.	750Ω	Inf.	780Ω	Inf.	10KΩ	
V 23	12LP4	†1.2KΩ	†5KΩ	PIN 10 ♦56KΩ	PIN 11 †400Ω	PIN 12 †1.2KΩ				

† Measured from pin 8 of V22
♦ Measured from pin 3 of V20

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RF TUNER

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	
V301	RF Amp.	6J6	7BF	
V302	Mixer	6J6	7BF	
V303	Oscillator	6J6	7BF	

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	IDENTIFICATION
R301	150Ω	½	RF Grid
R302	150Ω	½	RF Grid
R303	1000Ω	½	Bias Filter
R304	10KΩ	½	RF Coil Shunt
R305	1000Ω	½	RF Plate
R306	1000Ω	½	RF Plate
R307	5600Ω	½	Mixer Coil Shunt
R308	1 Meg	½	Mixer Grid
R309	1000Ω	½	Osc. Plate
R310	1000Ω	½	Osc. Plate
R311	100KΩ	½	Osc. Grid
R312	100KΩ	½	Osc. Grid
R313	47Ω	½	Osc. Cathode
R314	1000Ω	2	Mixer Decoup.

CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT	IDENTIFICATION
C301	8		Fixed Trimmer
C302	8		Fixed Trimmer
C303	1500		Bias Filter
C304	300		RF Coupling
C305	300		RF Coupling
C306	1.5		Neutralizing
C307	1.5		Neutralizing
C308	500		Filament Bypass
C309	500		RF Bypass
C310	1500		Mixer Grid Filter
C311	4.7		Osc. Feedback
C312	4.7		Osc. Feedback
C313	500		Filament Bypass
C314	1500		Mixer Decoupling
C315	68		Fixed Trimmer
C316	300		IF Coupling

COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	
L301	Interference Trap	0Ω		
L302	Interference Trap	0Ω		
L303	Ant. Input	0Ω		
L304	RF Low Band	0Ω		
L305	RF High Band	0Ω		
L306	Mixer Low Band	0Ω		
L307	Mixer High Band	0Ω		
L308	Osc. Low Band	0Ω		
L309	Osc. High Band	0Ω		
L310	IF Trans.	.2Ω	0Ω	

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6AS6	6AS6	7BD	
V2	Converter	6J6	6J6	9BK	
V3	1st Video IF Amp	6AS6	6AS6	7BD	
V4	2nd Video IF Amp	6AS6	6AS6	7BD	6AU6's used in model TV-107 and in some TV-106 models.
V5	3rd Video IF Amp	6AS6	6AS6	7BD	
V6	4th Video IF Amp	6AS6	6AS6	7BD	
V7	Video Det. and 1st Video Amp.	6AL5	6AL5	6BT	
V8	Video Amp.	12AU7	12AU7	9A	
V9	1st Sound IF Amp	6AS6	6BA6	7BK	
V10	2nd Sound IF Amp	6AS6	6BA6	7BK	
V11	3rd Sound IF Amp	6AS6	6AU6	7BK	
V12	Sound Det.	6AL5	6AL5	6BT	
V13	1st Audio Amp. and Clamper	6AQ5	6AQ5	7BT	
V14	Audio Output	6K6GT	6K6GT	7S	
V15	Sync. Amp.-Sep.	6SN7GT	6SN7GT	9BD	
V16	Vert. Osc.-Output	6SN7GT	6SN7GT	9BD	
V17	Hor. AFC-Hor. Osc.	6SN7GT	6SN7GT	9BD	
V18	Hor. Output	6BG6G	6BG6G	5BT	
V19	Damper	6W4GT	6W4GT	4CG	
V20	HV Rectifier	1B3GT	1B3GT	8C	
V21	LV Rectifier	5U4G	5U4G	4CM	
V22A	Picture Tube	12LP4	12LP4	12D	Used in models TV-944,945, 946.
B	Picture Tube	19BP4	19BP4	12D	Used in models TV-922,104,105,106,107, 108.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	CO-1496	AFH62J	UP8CJ			TVA-23	Output Decoupling
B	40	150			898				■ Filter
C	130	50							Vert. Output Cath. Byp.
C2A	40	450	CO-1496	AFH62J	UP8CJ			TVA-23	Output Decoupling
B	10	450	CO-1496	AFH62J6166	UP8CJ				■ Filter
C	30	300			898				■ Filter
C3	94	300	CO-1493	PRS350/24	BR2035			TVA-23	Output Decoupling
C4	5					NPOK-5			Fixed Trimmer
C7	1000					GP2L-001			RF Fil. Bypass
C8	120					GP2K-150			RF Decoupling
C9	100					GP1K-100			RF Coupling
C10	10					NPOK-10			Osc. Feedback
C11	20					NPOK-20			Osc. Grid Cap.
C12	1000					GP2L-001			Conv. Fil. Bypass
C13	1000					GP2L-001			RF Bypass
C14	68								Fixed Trimmer
C15	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	RF Bypass
C16	120	500		1468-00015	5W5T15	GP2K-150	MO.5-215	IFM-215	RF Coupling *
C17	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	AGC Filter
C18	.25	400	CO-H-4254	P488-25	GT4P25		ST-4-25	TC-2	" "
C19	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	1st V. IF Decoupling
C20	3300		32R32M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	RF Bypass
C21	270	500	5CM40A271K	1468-00025	5W5T25	GP2K-250	MO.5-325	IFM-325	IF Coupling
C22	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	AGC Filter
C23	3300		32R32M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	2nd V. IF Decoupling
C24	270	500	5CM40A271K	1468-00025	5W5T25	GP2K-250	MO.5-325	IFM-325	IF Coupling
C25	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	AGC Filter
C26	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	3rd V. IF Decoupling
C27	270	500	5CM40A271K	1468-00025	5W5T25	GP2K-250	MO.5-325	IFM-325	IF Coupling
C28	75			1468-000075		NPOM-75			Fixed Trimmer
C29	100	500	RCM20A101M	1468-0001	5W5T1	GP1K-100	MO.5-31	IFM-31	4th V. IF Cath. Bypass
C30	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	4th V. IF Decoupling
C31	270	500	5CM40A271K	1468-00025	5W5T25	GP2K-250	MO.5-325	IFM-325	IF Coupling
C32	220	500	RCM20A221M	1468-0002	5W5T2	GP2K-200	MO.5-32	IFM-32	IF Coupling
C33	15	400	CO-H-4153	P488-0001	5W5T2	GP1K-10	MO.5-41	ME-41	Det. Diode Filter
C34	.05	400	CO-H-4503	P488-05	GT4S5		ST-4-05	TM-15	Video Coupling
C35	.05	400	CO-H-4503	P488-05	GT4S5		ST-4-05	TM-15	" "
C36	.25	400	CO-H-4254	P488-25	GT4P25		ST-4-25	TC-2	Picture Cath. Decoup.
C37	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	1st S. IF Cath. Bypass
C38	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	1st S. IF Decoupling
C39	330	500	RCM20A331M	1468-00035	5W5T3	GP2K-300	MO.5-33	IFM-335	S. IF Coupling
C40	.01	600	CO-H-6103	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	2nd S. IF Grid Filter
C41	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	2nd S. IF Decoupling
C42	330	500	RCM20A331M	1468-00035	5W5T3	GP2K-300	MO.5-33	IFM-335	Limiter Grid Filter
C43	1500		CCR152M	1467-0015	1W5D15	GP2L-0015	MW.5-215	IFM-215	Limiter Decoupling
C44	75	500	5CM75A750K	1468-00025	5W5T25	GP2K-250	MO.5-325	IFM-325	RF Bypass *
C45	.002	600	CO-H-6202	P688-002	GT6S2	GP2M-002	ST-6-002	TM-22	Audio Coupling
C46	.002	600	CO-H-6202	P688-002	GT6S2	" "	ST-6-002	TM-22	" "
C47	.002	600	CO-H-6202	P688-002	GT6S2	GP2-336-02	ST-6-02	TM-11	" "
C48	.02	600	CO-H-6203	P688-02	GT6S2	GP2M-002	ST-6-002	TM-22	AF Plate Bypass
C49	.01	600	CO-H-6103	P688-01	GT6S1	GP2-336-01	ST-6-01	TM-11	Audio Coupling
C50	.005	600	CO-H-6502	P688-005	GT6S5	GP2M-005	ST-6-005	TM-25	Output Plate Bypass
C51	68	500	CO-H-4683	P488-05	GT4S5		ST-4-05	TM-15	Video Coupling
C52	100	500	RCM20A101M	1468-0001	5W5T1	GP1K-100	MO.5-31	IFM-31	Sync. Coupling
C53	300	1000	5CM40A301K	1468-0004	5W5T4		MO.5-94	IFM-594	Sync. Grd. Cath. Bypass
C54	.002	600	CO-H-6202	P688-002	GT6S2	GP2M-002	ST-6-002	TM-22	Integrator Net.
C55	.005	600	CO-H-6502	P688-005	GT6S5	GP2M-005	ST-6-005	TM-25	" "
C56	.005	600	CO-H-6502	P688-005	GT6S5	GP2M-005	ST-6-005	TM-25	" "
C56	4700		CCR472K	1467-005	1D5D5	GP2M-005	MW.5-25	IFM-25	Vert. Osc. Grid Cap.
C57	.1	1000	CO-H-1104	1089-1	TVC10P1		STM-10-1	PX-11	Vert. Discharge
C58	.25	400	CO-H-4254	P488-25	GT4P25		ST-4-25	TC-2	Vert. Sweep Coupling
C59	120	1000	5CM40A121K						Hor. Sync. Coupling
C60	120	1000	5CM40A121K						Fixed Trimmer
C61	.002	600	CO-H-6202	P688-002	GT6S2	GP2M-002	ST-6-002	TM-22	Differentiator Net.
C62	25	400	CO-H-4254	P488-25	GT4P25		ST-4-25	TC-2	AFC Filter
C63	.02	400	CO-H-4203	P488-02	GT4S2		ST-4-02	TM-12	" "

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C64	150	1000	SCM40C181J						Hor. Osc. Grid Cap.
C65	2300	1000	SCM40A223J						Hor. Discharge
C66	.05	400	CO-H-4503	P488-05	GT4S5		ST-4-05	TM-15	AFC Plate Bypass
C67	390	1000	SCM40A39-1K	1469-0004	5RS74		MS.5-34	MS-34	Hor. Sweep Coupling
C68	.25	400	CO-H-4254	P488-25	GT4P25		ST-4-25	TC-2	Hor. Output Cath. Byp.
C69	.05	400	CO-H-4503	P488-05	GT4S5		ST-4-05	TM-15	Hor. Output Screen Byp.
C70	.1	1000	CO-H-1104	1089-1	TVC10P1		STM-10-1	PX-11	Damper Filter
C71	.035	1000	CO-O-X353						" "
C72	8	1500	CO-1542						AFC Feedback
C73	600	15000	CT-1486			410-500			HV Filter
C74	.01	600	CO-H-6103	P688-01	GT6S1		ST-6-01	TM-11	Line Filter
C75	.01	600	CO-H-6103	P688-01	GT6S1		ST-6-01	TM-11	" "

* Not used in all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	50KΩ	½	PT-1479			Horiz. Hold Control } Dual Concentric
B	1 Meg.	½				Vert. Hold Control
R2A	10KΩ	½	PT-1478			Contrast Control } Dual Concentric
B	500KΩ	½				Brightness Control
R3A	1 Meg.	½	PT-1477	Q15-137	M-63-Z	Volume Control
B	Switch			76-1	SW-A	Attach to R3A Per Instructions
R4	500Ω	½	PT-1480	Q11-114	M-19-S	Vert. Linearity Control
R5	2.5 Meg.	½	PT-1481	Q11-239		Height Control
R6	25000	½	PT-1484		58-2500	Focus Control (Wire Wound)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
					ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R7	5900Ω	½			Ant. Coil Shunt
R8	10KΩ	½			RF Coil Shunt
R9	2200Ω	½			RF Decoupling
R10	470Ω	½			Conv. Grid
R11	220KΩ	½			Conv. Grid
R12	10KΩ	½			Osc. Grid
R13	470Ω	½			Osc. Plate
R14	47KΩ	½			RF Grid
R15	10KΩ	½	RER103K		1st Video IF Grid
R16	82Ω	½	RER390K		1st Video IF Cathode
R17	1000Ω	½	RER103K		1st Video IF Decoupling
R18	10KΩ	½	RER103K		2nd Video IF Grid
R19	39Ω	½	RER390K		2nd Video IF Cathode
R20	1000Ω	½	RER103K		2nd Video IF Decoupling
R21	1000Ω	½	RER103K	BTS-1000	AGC Network
R22	1000Ω	½	RER103K	BTS-1000	" "
R23	4700Ω	½	RER472J		3rd Video IF Grid 5%
R24	39Ω	½	RER390K		3rd Video IF Cathode
R25	2700Ω	½	RER272J		3rd Video IF Plate 5%
R26	1000Ω	½	RER103K		3rd Video IF Decoupling
R27	1 Meg.	½	RER105M	BTS-1 Meg.	AGC Network 20%
R28	150Ω	½	RER151K		4th Video IF Cathode
R29	5600Ω	½	RER562J		4th Video IF Plate 5%
R30	1000Ω	½	RER102K		4th Video IF Decoupling
R31	1 Meg.	½	RER105M	BTS-1 Meg.	AGC Diode Load 20%
R32	4700Ω	½	RER472J	BTS-4700-5%	Video Det. Diode Load 5%
R33	10KΩ	½	RER103K	BTS-10K	" " "
R34	1 Meg.	½	RER105M	BTS-1 Meg.	1st Video Amp. Grid 20%
R35	2900Ω	½	RER292J	BTS-2900-5%	1st Video Amp. Plate 5%
R36	1 Meg.	½	RER105M	BTS-1 Meg.	2nd Video Amp. Grid 20%
R37	472Ω	½	RER470M	BW-½-47	2nd Video Amp. Cathode 20%
R38	2800Ω	½	RER283K	BTS-2800	2nd Video Amp. Plate
R39	1000Ω	½	RER102K	BTS-1000	" " " "
R40	10KΩ	½	RER104M	BTS-100K	Voltage Divider 20%
R41	150Ω	½	RER151K		1st Sound IF Cathode
R42	5600Ω	½	RER562J		1st Sound IF Plate 5%
R43	1000Ω	½	RER102K		1st Sound IF Decoupling
R44	470KΩ	½	RER474M		2nd Sound IF Grid 20%
R45	82Ω	½	RER820K		2nd Sound IF Cathode
R46	18200Ω	½	RER183K		2nd Sound IF Decoupling
R47	22KΩ	½	RER223K		3rd Sound IF Grid
R48	10KΩ	½	RER103K		3rd Sound IF Decoupling
R49	100KΩ	½	RER104J	BTS-100K-5%	Disc. Load 5%
R50	100KΩ	½	RER104J	BTS-100K-5%	" " "
R51	10MΩ	½	RER106M	BTS-10 Meg.	1st AF Grid
R52	330KΩ	½	RER334M	BTS-330K	1st AF Plate
R53	470KΩ	½	RER474M	BTS-470K	Output Grid 20 %
R54	100KΩ	1	RER104M	BW-1-100K	Filter 20%
R55	1 Meg.	½	RER105M	BTS-1 Meg.	Sync. Amp. Grid
R56	68KΩ	½	RER683M	BTS-68K	Sync. Amp. Plate 20%
R57	3.3 Meg.	½	RER335M	BTS-3.3 Meg.	Sync. Sep. Grid
R58	680Ω	½	RER682K	BTS-680Ω	Sync. Sep. Cath.
R59	22KΩ	½	RER223M	BTS-22K	Integrator 20%
R60	820Ω	½	RER822K	BTS-820Ω	"
R61	820Ω	½	RER822K	BTS-820Ω	" "
R62	1 Meg.	½	RER105M	BTS-1 Meg.	Vert. Osc. Grid 5%
R63	1.5 Meg.	½	RER155K	BTS-1.5 Meg.	Vert. Osc. Plate
R64	6.8 Meg.	½	RER685K	BTS-6.8 Meg.	Voltage Divider
R65	100KΩ	½	RER104K	BTS-100K	" "
R66	2.2 Meg.	½	RER225M	BTS-2.2 Meg.	Vert. Output Grid 20%
R67	560Ω	½	RER561K	BTS-560	Vert. Output Cathode
R68	3300Ω	½	RER332M	BTS-3300	Vert. Peaking 20%
R69	560KΩ	½	RER564K	BTS-560K	Horiz. AFC Grid
R70	5.5 Meg.	½	RC32SJ	BTA-5.5Meg-5%	Voltage Divider 5%
R71	150KΩ	½	RER154K	BTS-150K	Feedback
R72	180KΩ	½	RER184K	BTS-180K	Horiz. AFC Cathode
	100KΩ	1	REC104J	BTA-100K-5%	Horiz. AFC Cathode 5%
R74	100KΩ	1	REC104J	BTA-100K-5%	Horiz. Osc. Grid 5%
R75	82000Ω	½	RER822K	BTS-8200	Horiz. AFC Filter

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R76	270KΩ	½	RER274K		
R77	10KΩ	½	RER103K	BTS-10K	Horiz. Osc. Transformer Shunt
R78	120KΩ	1	REC124K	BTA-120K	Horiz. Osc. Plate
R79	120KΩ	½	RER124K	BTS-120K	Voltage Divider
R80	33KΩ	½	RER333K	BTS-33K	" "
R81	10KΩ	½	RER103K	BTS-10K	Filter
R82	1 Meg.	½	RER105M	BTS-1 Meg.	Horiz. Output Grid 20%
R83	472	½	RER470M		Parasitic Supp. 20%
R84	82Ω	1	REC820K	BW-1-82	Horiz. Output Cathode
R85	4700Ω	1	REC472K	BTA-4700	Horiz. Output Screen
R86	56KΩ	½	RER563K	BTS-56K	Filter
R87	560KΩ	½	RER564K	BTS-560K	Feedback
R88A	272	1		BW-1-27	Horiz. Centering Wire wound
B	273	1		BW-1-27	Horiz. Centering Wire wound 20%
R89	1 Meg.	1	REC105M		HV Filter
R90	680Ω	1	REC681K	BTA-680	Focus Coil Shunt
R91	680Ω	1	REC681K	BTA-680	" " "
R92	680Ω	1	REC681K	BTA-680	" " "
R93A	1125Ω	20	RE-1505		Filter Wire wound
B	6102	20			Voltage Divider Wire wound
R94A	1250Ω	2	RE-1504	BW-2-100	Voltage Divider Wire wound
B	350	1		BW-1-35	Voltage Divider Wire wound
C	8200Ω	6		AB-8000	Bleeder Wire wound

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.
T1	117VAC @ 1.75A	710VCT @ .25A; 325V @ .4; 6.3VAC @ .6A	5VAC @ 3A	6.3VAC @ 9.2A	TR-1688	P-8153 †† P-5014		P-3059

†† Drill new mounting holes.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	NOTES
T2	110Ω Tap @ 30Ω		TR-1475				Hor. Osc. Trans.
T3	160Ω	850Ω; 5Ω; 1.2Ω	TR-1473	A-8111	TS0-1	A-3000	Vert.Block.Osc.Trans.
T4	300Ω Tap @ 130Ω	1074Ω; .5Ω; .2Ω	TR-1492	A-8117	TFB-1		Hor. Output Trans.
T5	730Ω	8.5Ω	TR-1343	A-8115	TS0-2	A-3035 ††	Vert.Output Trans.
T6A	125Ω		CL-1356	DY-1			Hor. Deflection Yoke
B	55Ω						Vert. Deflection Yoke
T7	330Ω		CL-1687				Focus Coil

†† Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
T8	6200Ω	5.5Ω	275Ω	.4Ω	TR-1506	A-8114	RO-16 ††	A-2031	†† Drill new mounting holes

SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
SP1A	FIELD: PM; V. C. IMP.: 3.5Ω	SK-792 SK-1821 SK-1634-1	ST-109 MOD.P6-W	6A21	Used in model TV-944. Used in model TV-922, & TV-104. Used in model TV-945 & TV-105.
B					
C					
SP2A	CONE DIA.: 6"				
B	4" x 6"				
C	8"				

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (@ CURRENT 1000 MA)	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
L1	.230A	62Ω	2.6Henries	CK-1346	C-2325††	TR-4225	C-2511††	†† Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: MEISSNER PART No.	NOTES
L2	Ant. Strip	0Ω				Part of Tuner
L3	RF Mixer & Osc. Strip	0Ω				" " "
L4	Fil. Choke	.12				" " "
L5	Fil. Choke	.12				" " "
L6	Conv. Trans.	0Ω	0Ω			" " "
L7	1st Video IF	.5Ω				" " "

OLYMPIC MODELS TV-104, 105, 106, 107, 108. 922L, 944, 945, 946

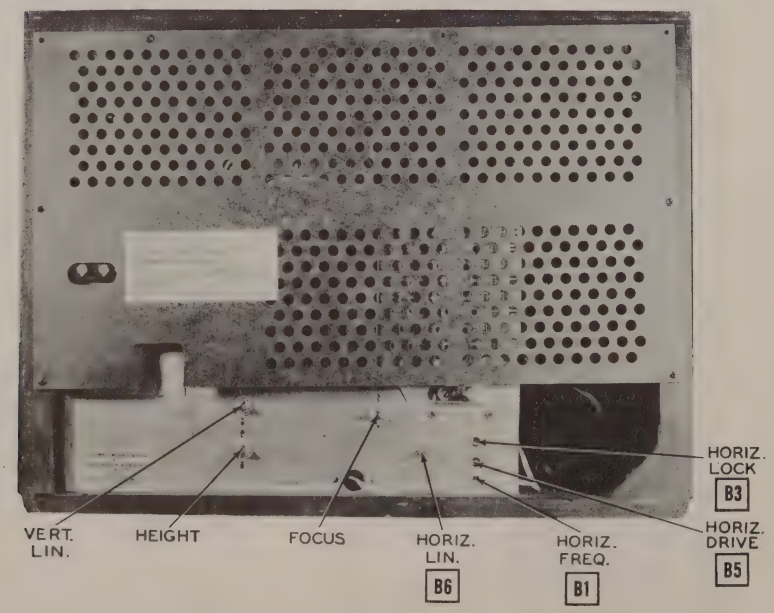
PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF) CONT.

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA OLYMPIC PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L8	2nd Video IF	.1Ω		CL-1471		
L9	3rd Video IF	.1Ω		CL-1471		
L10	4th Video IF	.1Ω		CL-1471		
L11	Sound Trap	0Ω		CL-1472		
L12	5th Video IF	.1Ω		CL-1471		
L13	Peaking	3Ω		CL-1535		
L14	Peaking	8Ω		CL-1537		Wound on 36KΩ resistor . Some models have this coil in plate circuit of 1st Video Amp.
L15	Peaking	8Ω		CL-1536		Wound on 39KΩ resistor.
L16	Peaking	6Ω		CL-1537		Wound on 22KΩ resistor.
L17	1st Sound IF	.1Ω		CL-1471		
L18	2nd Sound IF	.1Ω	.1Ω	TR-1470		
L19	Disc. Trans.	.1Ω	.1Ω	TR-1469		
L20	Width Cont.			CL-1502		Not used on all models.
L21	Hor. Linearity	36Ω		CL-1503		

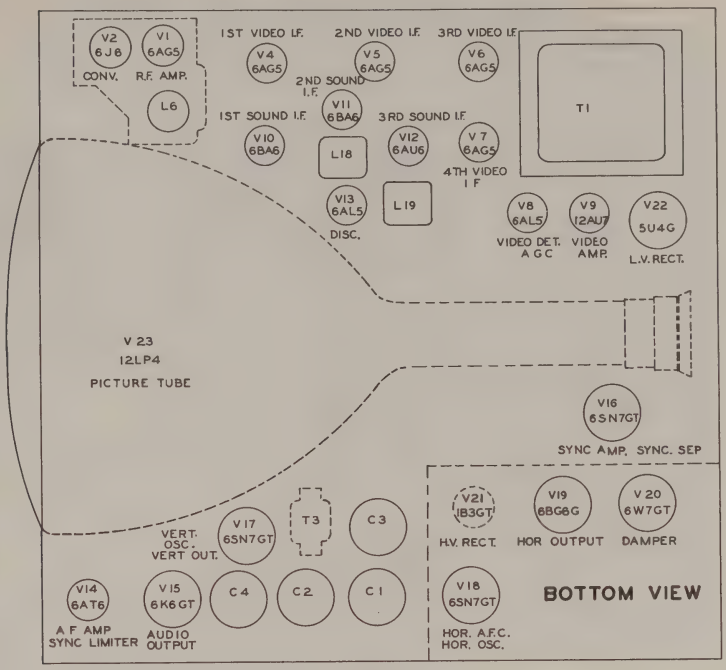
MISCELLANEOUS

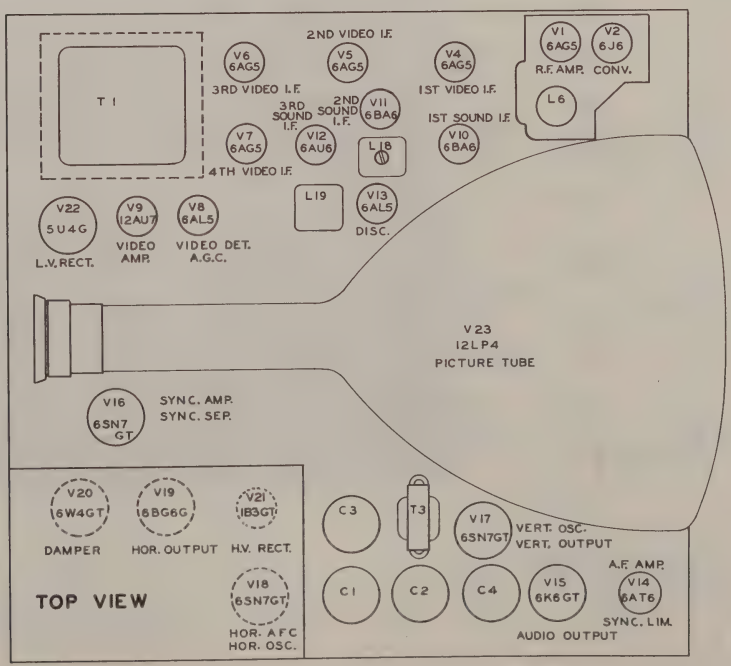
ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M1A	Tuner	CL-1677	12 Channel-2 Tubes
B	Tuner	CL-1633	12 Channel-3 Tubes
C	Tuner	CL-1428	13 Channel-3 Tubes (Alternate)
M2	Fuse	FU-1633	Type AGC .25A
M3	Ion Trap	PP-1347	PM
	Cabinet	CA-1702	For Model TV-104
	Cabinet	CA-1727	For Model TV-105
	Cabinet	CA-1467	For Model TV-922L
	Cabinet	CA-1709	For Model TV-944
	Cabinet	CA-1698	For Model TV-945
	Safety Glass	PP-1527	For Model TV-922L and TV-105
	Safety Glass	PP-1712	For Model TV-944 and TV-945
	Safety Glass	PP-1703	For Model TV-104
	Back	ST-1545-1	Masonite For Model TV-922L and TV-104
	Back	ST-1713	Masonite For Model TV-944, TV-945 and TV-105
	Knob	KN-1516	Mahogany Outer Knob
	Knob	KN-1517	Mahogany Inner Knob
	Knob	KN-1518	Mahogany Volume Control Knob
	Knob	KN-1586	Tan Outer Knob
	Knob	KN-1587	Tan Inner Knob
	Knob	KN-1588	Tan Volume Control Knob
	Knob	KN-1514	Mahogany Channel Selector (Used with M1A and M1C)
	Knob	KN-1515	Mahogany Fine Tuning (Used with M1A and M1C)
	Knob	KN-1584	Tan Channel Selector (Used with M1A and M1C)
	Knob	KN-1585	Tan Fine Tuning (Used with M1A and M1C)

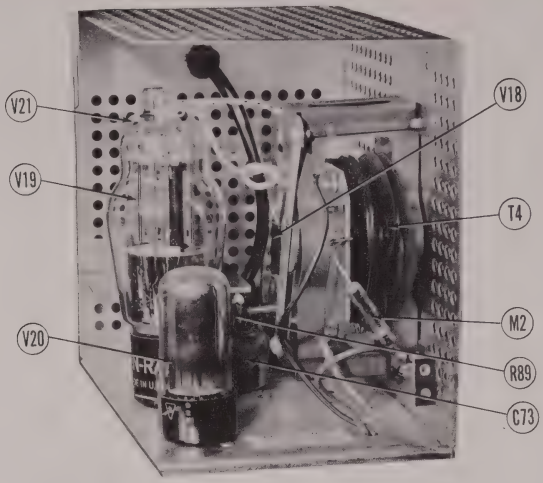


CABINET-REAR VIEW

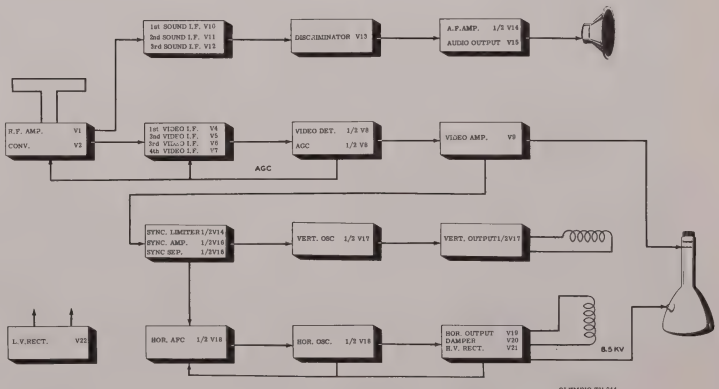
TUBE PLACEMENT CHART







HIGH VOLTAGE COMPARTMENT



BLOCK DIAGRAM

HORIZONTAL OSC. AND LINEARITY ADJUSTMENTS

HORIZONTAL OSCILLATOR ALIGNMENT CHECK:

Tune in test pattern and turn horizontal hold control to extreme counter-clockwise position. Picture should remain in synchronization. Turn channel switch to another channel and then back to the original channel. Normally, the picture should be out of synchronization. Turn the control clockwise and the picture should slowly begin to synchronize and finally lock-in. This should occur when the control is approximately 90° from the extreme counter-clockwise position. The picture should remain in synchronization for another 90° in the clockwise direction of the control. At the extreme clockwise position the picture should again drop out of synchronization and 3½ to 4½ bars should be seen sloping downward to the right. If the receiver fails to hold synchronization during this check with the hold control at the extreme counter-clockwise position or fails to hold synchronization for at least 60° in the clockwise direction from the point when it drops into "sync." it will be necessary to align the horizontal oscillator circuit as follows:

(A) HORIZONTAL OSCILLATOR ALIGNMENT:

Turn horizontal hold control to extreme clockwise position. Tune in test pattern and adjust trimmer B1 until picture is out of sync. and shows 3½ to 4½ bars sloping downward to the right. If the trimmer has insufficient range, set it to its mid-position (one turn from tight) and adjust slug B2 until bars appear.

(B) HORIZONTAL LOCKING ALIGNMENT:

Turn the horizontal hold control to full counter-clockwise position. Switch to another channel and back to the original again.

Slowly turn horizontal hold control clockwise and note the least number of diagonal bars present just before picture syncs. If more than 4½ bars are present just before picture syncs. adjust "horizontal lock" trimmer B3 slightly clockwise. If less than 3½ bars are present adjust B3 slightly counter-clockwise and switch channel selector to another channel and back again. Recount bars present at the "lock-in" point. Repeat this procedure until 3½ to 4½ bars are present.

Repeat Steps (A) & (B) until conditions exist as outlined under "Horizontal Oscillator Alignment Check".

WIDTH, DRIVE & HORIZONTAL LINEARITY ADJUSTMENTS:

Turn width control B4 to maximum clockwise position. Adjust "horizontal drive" trimmer B5 for maximum brightness and linearity. Adjust horizontal linearity B6 for best linearity in the right half of the picture. Readjust width control until picture fills the mask.

HEIGHT & VERTICAL LINEARITY ADJUSTMENTS:

Adjust the height control until picture fills mask vertically. Adjust the vertical linearity control until the test pattern is symmetrical from top to bottom.

Due to intraction between these two controls it is necessary to repeat the adjustments. Adjust the vertical centering control to align the picture with the mask.

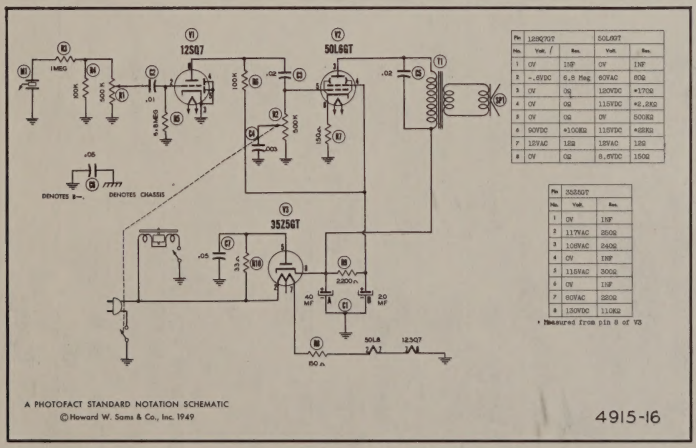
DISASSEMBLY INSTRUCTIONS

1. Remove eight push-on type control knobs.
2. Remove eight Phillips head screws holding back cover. Remove cover. Remove speaker plug from rear of chassis.
3. Remove four 7/16" hex head machine bolts holding chassis. Remove chassis.
4. Remove four 11/32" hex nuts holding speaker. Remove speaker.

SILVERTONE MODEL 9153
(Ch. 435.417)

SILVERTONE MODEL 9153

TRADE NAME	Silvertone, Model 9153 (Ch.435.417)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan St., Chicago, Illinois.
TYPE SET	AC Operated Phono Player with 3 Tube Amplifier.
TUBES (THREE)	Types 12SQ7GT AF Amp., 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC RATING .25 Amp. @ 117 Volts AC
TUNING RANGE--BROADCAST	



Pin No.	12SQ7GT Volt.	Res.	50L6GT Volt.	Res.
1	0V	1MΩ	0V	1MΩ
2	-.6VDC	6.8 Meg	60VAC	80Ω
3	0V	0Ω	120VDC	*170Ω
4	0V	0Ω	110VDC	*2.8KΩ
5	0V	0Ω	0V	500KΩ
6	90VDC	*100KΩ	110VDC	*68KΩ
7	12VAC	1Ω	12VAC	1Ω
8	0V	0Ω	8.6VDC	150Ω

Pin No.	35Z5GT Volt.	Res.
1	0V	1MΩ
2	117VAC	85Ω
3	108VAC	240Ω
4	0V	1MΩ
5	115VAC	300Ω
6	0V	1MΩ
7	60VAC	28Ω
8	130VDC	110KΩ

* Measured from pin 8 of V3

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, no signal applied for voltage measurements.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1949 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	AF Amp.	12SQ7GT	12SQ7GT	8Q	
V2	Power Output	50L6GT	50L6GT	7AC	
V3	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	150	R61683	PRSA150/40-20	CDL4215		DSB-5030-150	TA-240	Filter Red
B	*20	150		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Filter Green
C2	.01	400		P488-02	GT4S2		ST-4-02	TM-12	Audio Coupling
C3	.02	400		P688-003	GT6D3	GP2M-003	ST-6-003	TM-23	Audio Coupling
C4	.003	200		P488-02	GT4S2		ST-4-02	TM-12	Tone Composition
C5	.02	400		P488-05	GT4S5		ST-4-05	TM-15	Output Plate Bypass
C6	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Line Isolation
C7	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Line Filter

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	R57101	D13-133	M-60-Z	Volume control
B	Shaft		Not Req.	A	Not Req.	Attach to R1A per instructions
R2A	500KΩ	½	R57106	D13-133	M-60-Z	Tone control
B	Shaft		Not Req.	A	Not Req.	Attach to R2A per instructions
C	Switch		Not Req.	41	SW-A	Attach to R2A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	IDENTIFICATION CODES
R3	1 Meg	½		BTS-1 Meg	Series Phono
R4	100KΩ	½		BTS-100K	Phono Shunt
R5	6.8 Meg	½		BTS-6.8 Meg	AF Grid
R6	100KΩ	½		BTS-100K	AF Plate
R7	150Ω	1		BW-1-150	Output Cathode
R8	150Ω	10	R57092	AB-150	Line Dropping
R9	2200Ω	2		BT-2-2200	Filter
R10	33Ω	1	R60555		Rectifier Ballast

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: SILVERTONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T1	2400Ω	3.5Ω	180Ω	.5Ω	R60559	A-3876	RO-2	A-2928	

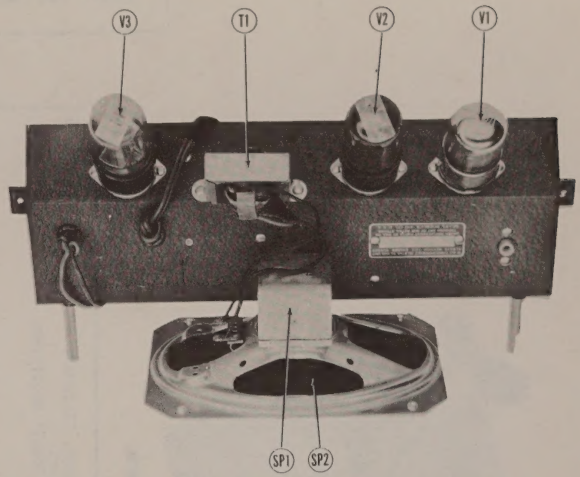
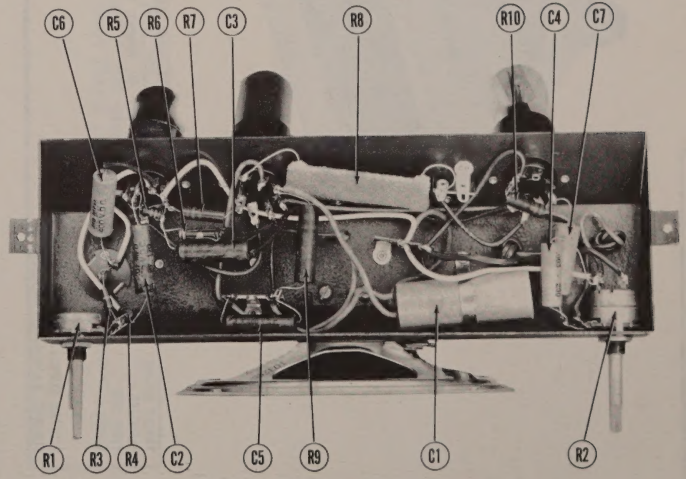
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
SP1	FIELD	V.C. IMP.	R60556		46A15	
	PM	3.5Ω				
	CONE DIA.	V.C. DIA.				
SP2	4"x6"	9/16"				

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: ASTATIC PART No.	REMARKS
M1		LT-3M	

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW